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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.
The Feeder Dam at Glens Falls did not reveal any conditions which would render the dam a hazard to life or property. A number of deficiencies were found which will require immediate attention.

UPPER HUDSON RIVER BASIN

FEEDER DAM AT GLENS FALLS

WARREN - SARATOGA COUNTY
NEW YORK
INVENTORY NO. N.Y. 143

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

CONTRACT NO. DACW-51-79-C0001

NEW YORK DISTRICT CORPS OF ENGINEERS

FEBRUARY , 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probably Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
FEEDER DAM @ GLENS FALLS
I.D. No. NY-143
(#378 - UH)
UPPER HUDSON RIVER BASIN
WARREN-SARATOGA COUNTIES, NEW YORK

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PHASE 1 REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Feeder Dam @ Glens Falls I.D. No. NY-143 (#378 - UH)
State Located:	New York
County Located:	Warren - Saratoga
Watershed:	Upper Hudson River Basin
Stream:	Hudson River
Date of Inspection:	November 2, 1978

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, significant deficiencies and deterioration was observed at one portion of the dam, the North Bulkhead, so as to warrant additional study and analysis as well as corrective action by maintenance forces. Such corrective action should be completed prior to the next period of anticipated high river flows (Spring 1980). All additional data gathering and investigations should be completed within one year of the date of this Phase 1 report and all remedial measures deemed necessary, based upon the findings of the investigations, should be completed within two years of the date of this report. During the interim period, a detailed emergency-operation plan and warning system should be developed and implemented.

The spillway capacity of the dam, although not having sufficient discharge capacity for passing one-half the Probable Maximum Flood (PMF), is considered to be inadequate. For such a large storm event, a high tailwater condition would result in the flooding of the downstream hazard areas. Hence, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just before overtopping failure. In addition, the structural stability analysis performed for the spillway does not indicate unacceptable factors of safety for either overturning or sliding when subjected to the one-half PMF event.

Other deficiencies found during the visual inspection concerned concrete surface deterioration and cracking, non-operable or non-existent gate machinery, and an overall need for increased maintenance of the dam. Such deficiencies should be corrected and completed by maintenance forces within two years of the date of this report.

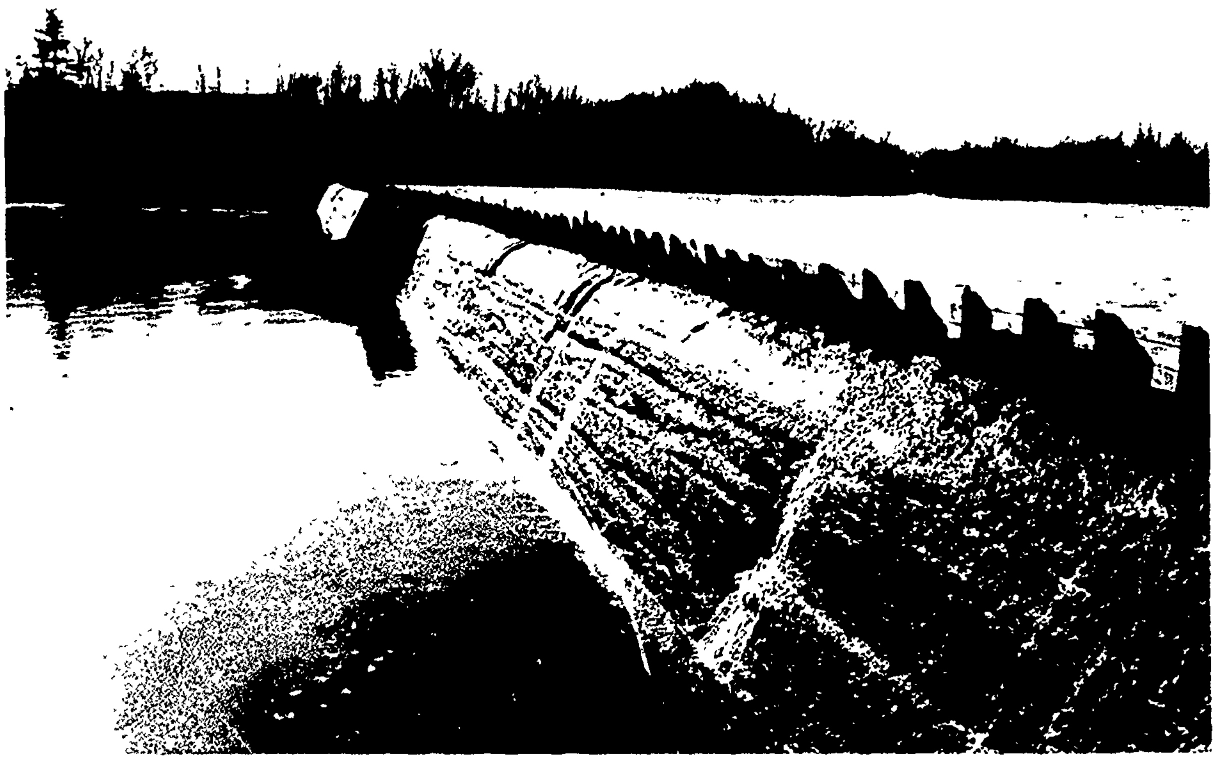
George Koch

George Koch
Chief, Dam Safety Section
New York State Department of
Environmental Conservation
NY License No. 45937

Approved By:

Col. Clark H. Benn
New York District Engineer

Date: 10 July 79



OVERVIEW

FEEDER DAM @ GLENS FALLS
(Looking South)

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
FEEDER DAM @ GLENS FALLS
I.D. No. NY-143
(#378 - UH)
UPPER HUDSON RIVER BASIN
WARREN-SARATOGA COUNTIES, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property, and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures

The Feeder Dam at Glens Falls is a concrete gravity dam having a 615 foot long ungated river spillway section with flashboards including a 20 foot wide inclined logway; a North Bulkhead adjacent to the spillway section, 114 feet long containing 6 vertical-lift gates; a Feeder Canal Intake Structure adjacent to the North Bulkhead, 64 feet wide containing a tainter gate and 2 vertical-lift sluice gates; a 65 foot long concrete abutment wall extending into the existing ground; a South Bulkhead adjacent to the spillway section, 151 feet long containing 8 vertical head gates; a 35 foot long concrete gravity abutment wall extending into the existing ground. A drawing showing the pertinent features at the dam is included in Appendix H.

An operating hydroelectric power station is located immediately Southeast of the spillway-South Bulkhead contact. The South Bulkhead gates control the inflow to the forebay of the power station. This power station houses 5 hydromachinery units which discharge into a river tailrace immediately downstream of the dam.

b. Location

The dam is located on the Hudson River, Southwest of the City of Glens Falls and approximately 0.8 miles Southeast of Interchange 18 of Interstate 87.

c. Size Classification

This dam is 36 feet high and impounds a reservoir of 6200 acre-feet. It is classified as an "intermediate" size dam (storage capacity between 1000 and 50,000 acre-feet).

d. Hazard Classification

The dam is classified "high" hazard because of the downstream populations located in South Glens Falls and the City of Glens Falls.

e. Ownership

The Feeder Dam at Glens Falls is owned by the State of New York, Department of Transportation (NYS-DOT), Waterways Maintenance Subdivision. It is located in DOT-Region One, whose headquarters are in Albany, New York.

Waterways Maintenance Subdivision	Region One
New York State-DOT Main Office - State Campus 1220 Washington Avenue Albany, New York 12232	NYS - DOT 84 Holland Avenue Albany, NY 12208
Director - Mr. Joseph Stellato (AC - 518) 457-4420	Waterways Maintenance: Engineer - Mr. John Hulchanski (AC - 518) 474-6715

f. Purpose of Dam

The primary purpose is for flow diversion into the Glens Falls Feeder Canal. This canal supplies the Champlain Barge Canal, at its summit located 5 miles downstream, with water for navigation. The dam provides a storage pool for the hydroelectric power station and it also functions as a flood control structure.

g. Design and Construction History

The original dam at this site was constructed prior to February 1870 as a straight-aligned crib structure extending across the entire river. Saw mill buildings existed near the present locations of the North Bulkhead and hydroelectric power station. A water-feed by-pass and navigation lock existed at the present location of the Feeder Canal Intake Structure. The existing concrete gravity dam with appurtenant structures was constructed in about the year 1913, and the former dam located just upstream was removed. Power station construction occurred in 1923.

h. Normal Operating Procedures

Water flows over the ungated spillway section. Flow diversions from the storage pool occur through the Feeder Canal Intake Structure and through the head gates in the South Bulkhead. The North Bulkhead gates are not operable.

1.3 PERTINENT DATA

a. Drainage Area (square miles)

2801

b. Discharges at Dam (cfs)

See Page 3

		DISCHARGE				
STAGE	DESCRIPTION	SPILLWAY *	NORTH BULKHEAD GATES	FEEDER CANAL SLUICE GATES	SOUTH BULKHEAD GATES	(CFS) TOTAL
282.0	Spillway Crest	0	3436	104	12936	15936
283.5	Top-Bulkhead Gates	---	4800	186	15408	-----
284.9	Top-Flashboards	11055	7338	254	22272	40919
287.5	Top-Sluice Gates	---	----	334	-----	-----
290.0	Top of Dam	58029	10350	1178	28392	97949

* without Flashboards

Hydroelectric power station machinery (5 units) (cfs) 5,000

Maximum recorded discharge (April 12, 1922) 56,876

c. Elevations (Barge Canal Datum - BCD)

Top of South Bulkhead	297.0
Top of Feeder Canal Intake Structure and North Abutment Wall. Existing ground @ North Abutment Wall	292.0
Top of Dam	
Top of North Bulkhead Existing ground @ South Abutment Wall	290.0
Top of Flashboards	284.9
Spillway Crest	282.0
Inclined Logway Crest	280.0
Feeder Canal Sluice Gates - bottom	279.5
North Bulkhead gates - bottom	276.0
South Bulkhead gates - bottom	270.0

Datum Conversion:

USGS 0.0 equals BCD 1.18

d. Reservoir

	Surface Area (acres)
Top of Dam	493
Top of Fla'hboards - Normal Pool	493
Spillway 'rest	493
Logway Crest	493

e. Storage Capacity (est.)	(acre-feet)
Top of Dam	10100
Top of Flashboards	7600
Spillway Crest	6200
Logway Crest	5200

f. Dam

Type: Concrete gravity with appurtenant structures

Length:		(feet)
	Spillway Crest	615
	Inclined Logway	20

Height:		(feet)
	Structural	36

Width @ Spillway Crest:		(feet)
	Upstream radius	2
	Downstream radius (ogee)	6

Width @ Logway Crest:		(feet)
	Upstream radius	1
	Total	3.5

g. Spillway

Type: Ungated, ogee-section, concrete gravity structure including an inclined logway and having wooden flashboard

Weir Length.		(feet)
	Spillway Crest	615
	Inclined Logway	20

Crest Elevation (BCD):		
	Spillway Crest	282.0
	Logway Crest	280.0

h. Reservoir Drain — None

i. Appurtenant Structures

1) North Bulkhead:

6 vertical - lift gates with each opening (7.5' H x 14.92' W)

Control Machinery - inoperative

Length (feet)	114
Elevations (BCD):	
Top	290.0
Top of Gate Opening	283.5
Bottom of Gate Opening	276.0

2) Feeder Canal Intake Structure:

Entrance Control structures:

Tainter Gate - 15.8' W
Needle Dam

Canal Discharge Control structures:

Two vertical - lift sluice gates with each opening (8' H x 6' W)

Width of entire Intake Structure:	(feet)
@ Entrance Control Structures	64
@ Discharge Control structures	50
@ Feeder Canal (channel)	40

Elevations (BCD):	
Top (wall)	292.0
Top of sluice gate opening	287.5
Bottom of sluice gate opening	279.5
Feeder Canal (channel) invert	275.0 (est.)

3) North Abutment Wall:

Concrete structure extending from the Feeder Canal Intake structure into the existing ground.

Length (feet)		65
Elevation (BCD):	Top	292.0

4) South Bulkhead:

8 vertical - lift gates with each opening (13.5' H x 15' W)
Control machinery - non-existent

Length (feet)	151
Elevations (BCD):	
Top	297.0
Top of Gate Opening	283.5
Bottom of Gate Opening	270.0

5) South Abutment Wall:

Concrete gravity structure extending from the South Bulkhead into the existing ground.

Length (feet)		35
Elevation (BCD):	Top	290.0

6) Hydroelectric Power Station:

The forebay located directly downstream of the South Bulkhead leads to 5 hydromachinery units.

18 Bays - each opening (13.3' W) with trash racks

5 Hydromachinery units - each @ 1000 cfs capacity

Ice sluice located at the East end of the forebay; opening (6'± diameter concrete pipe)

Elevations (BCD):

Design High Water	290.0
Top of Trash Racks	288.0
Top of Flashboards - Normal Pool (Dam)	284.9
Minimum Water Surface	282.0
Design High Tailwater	281.0
Centerline of hydromachinery units	275.0
Design Low Tailwater	268.0
Bottom of Trash Racks	266.25
Bottom of hydromachinery units	251.5

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Geology

The Feeder Dam at Glens Falls is located in the Hudson Valley Lowlands physiographic province of New York State. Rock in this area was formed during the Ordovician period. The bedrock in these areas is predominantly limestone and dolostone. The present surficial soils have resulted primarily from glaciations during the Cenozoic Era; the Wisconsin glaciation being the most recent event to affect this area, having occurred approximately 11,000 years ago.

b. Subsurface Investigations

No records of any subsurface investigations were available. Based on the plans which were available for this structure, it appears that the structure is founded on bedrock.

c. Dam and Appurtenant Structures

The present dam was constructed about the year 1913; having replaced a crib structure which had been in existence prior to February 1870. The present structure was designed by the New York State Department of Public Works (now NYS-DOT). Drawings for the construction of the present dam (Contract No. 56, Champlain Canal - Section 2) are included in Appendix H).

Since the 1913 dam construction, major changes have been made on both ends of the structure. The NYS-DOT modified the Feeder Canal end of the dam by removing the bypass and navigation lock and installing a tainter gate and two sluice gates for flow control into the Canal channel. A drawing showing the modification is included in Appendix H. The hydroelectric power station was constructed adjoining the South Bulkhead in 1923. The station was designed by Mr. A.H. White, Chief Engineer for the Moreau Manufacturing Corporation. Drawings for this construction are included in Appendix H. Presently, the power station is operated by Niagara Mohawk Power Corporation, who also have ownership and maintenance responsibility for the flashboards existing on the spillway crest.

2.2 CONSTRUCTION RECORDS

No records were available regarding the construction of the dam. Correspondence concerning the construction of the power station was obtained from the files of the Department of Environmental Conservation.

2.3 OPERATION RECORD

The dam is visually inspected on an irregular basis by engineers from NYS-DOT. Mean daily water levels were recorded from 1916 to 1961 by NYS-DOT using a gauge located just upstream from the canal intake gates. These records are on file at the NYS-DOT Region One, Waterways Maintenance Office. Although the gauge still exists, no readings have been regularly recorded since 1961. Water surface levels in the power station forebay are monitored on an irregular basis.

2.4 EVALUATION OF DATA

The data presented in this report was obtained from the files of the Department of Environmental Conservation and the New York State Department of Transportation, plus conversations with Niagara Mohawk Power Corporation engineers. The information available appears to be adequate and reliable for Phase 1 inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Feeder Dam at Glens Falls and the surrounding area was conducted on November 2, 1978. The weather was clear and sunny with the temperature near 45° F. The water surface elevation recorded from the gauge was 284.55.

b. Dam - Spillway

No flow was occurring over the spillway except for minor quantities resulting from wave action over the top of the flashboards. The horizontal and vertical alignment of the crest as well as the condition of the Spillway-North Bulkhead contact were satisfactory. The exposed concrete surface revealed deterioration over its entirety. The surface was rough and uneven, with holes and depressions resulting from the removal of concrete and aggregate. Two larger eroded depressions were observed on the Spillway section nearer the North Bulkhead.

The flashboards were relatively new with minor leakage in several locations occurring under the boards. The horizontal alignment of the flashboards was not straight; having three large bowed-out sections, two north of the logway and one south of it.

c. Appurtenant Structures

1) North Bulkhead: This structure was the most severely deteriorated portion of the entire dam. Deficiencies consisted of cracked concrete slabs, spalled and eroded concrete surfaces, reduced structural wall thicknesses, and leakage through concrete walls. For clarity, Bay 1 is that lift-gate section of the Bulkhead nearest the Feeder Canal Intake Structure and Bay 6 is nearest the Spillway.

The following deficiencies were observed:

a) Leakage through the structural concrete vertical members, referred to as buttress walls, nearest the gates at Bays 3/4, (most severe), 1/2, and 1/abutment.

b) Leakage at Bay 2 through the concrete overhang located directly behind the vertical plane of the gate.

c) Leakage of the gates either around the periphery or through the wood itself or both at all 6 Bays.

d) Deteriorated concrete buttress walls at the elevation of the gate bottom (276.0). The following table indicates the extent of deterioration from the original 30 inch thick walls:

Buttress Wall	Thickness Remaining	Concrete Loss
1/2	18"	12"
2/3	21"	9"
3/4	21"	9"
4/5	22"	8"
5/6	___	minor

e) Concrete cracking entirely across and through the top slab spanning Bay 6.

f) Structural cracking and vertical displacement at the Bay 6 concrete overhang - spillway abutment contact.

g) Concrete cracking across the top slabs spanning all the Bays, primarily at mid-span and at each end of the span, and cracking between the anchor bolts for the existing gate machinery.

h) Concrete deterioration of the bulkhead base slab (Elev. 271.0±) similar to the surface of the spillway.

i) Concrete spalling of the top surface of the Bay 1 top slab.

j) Non-operable gate machinery at Bays 2, 3, 6 and non-existent gate machinery at Bays 1, 4, and 5. The machinery present had steel welded to the gears to prevent movement of the gates.

The Spillway - Bay 6 abutment wall downstream of the Bulkhead was in satisfactory condition; revealing only minor spalling of the concrete surfaces.

2) Feeder Canal Intake Structure: Visual inspection of the concrete surfaces revealed only minor concrete surface spalling and cracking. The visible portions of the tainter gate and concrete needle dam were in satisfactory condition. It was not determined if the tainter gate is a fixed or moveable flow control device. The sluice gates were partially open and appeared to be functioning satisfactorily.

This Intake Structure transitions into the mortar-surfaced masonry walls of the canal (channel) near the outlets of the two sluice gates. Inspection of these masonry walls revealed concrete cracking and joint separation along both sides of the channel. Minor leakage from the canal was observed coming through the river-side wall at several locations downstream of the Intake Structure. Approximately 150 feet downstream and along this wall, there exists a 3.5 foot wide vertical sluice gate which also was leaking. Dumped stone-block rubble buttresses this outer channel wall.

3) North Abutment Wall: This concrete structure was in satisfactory condition. The top of this wall and the existing ground were at the same elevation with no indication of soil erosion.

4) South Bulkhead: This structure could not be closely inspected because of a locked fence barring access to the structure's top slab. However, minor concrete cracking and spalling was noticeable on both upstream and downstream vertical surfaces spanning the 8 gates. No in-place gate machinery existed for operating these head gates. However, flow through the gates into the forebay was occurring unimpeded.

5) South Abutment Wall: This concrete structure was in satisfactory condition. Some existing ground directly upstream of the wall had been eroded but this area extended only 10 feet or less back from the river's edge. The remainder of the existing ground was at the same elevation as the top of the wall.

6) Hydroelectric Power Station: This operating power station is under the regulatory control of the Federal Energy Regulatory Commission and is subject to their inspection criteria. Therefore, a detailed inspection of this structure was not made. However, visual observations of the areas at the forebay, ice sluice, and tailrace did not reveal any unusual conditions.

d. Reservoir
Trees and brush as well as open fields occur along the river's edge. There was no signs of soil instability in the reservoir area immediately upstream of the dam.

e. Downstream Channel
No unusual conditions were noticeable in the downstream Hudson River channel. Trees and brush grow to and along the edge of the river.

3.2 EVALUATION OF OBSERVATIONS

Visual observations of the dam (spillway) did not reveal any problems which would affect the immediate safety of the structure. The deficiencies observed can be corrected by increasing the maintenance effort expended on this particular part of the entire river structure.

Visual observations of the North Bulkhead did reveal conditions which could affect the integrity of the structure if allowed to deteriorate further. Specifically, leakage through the structural concrete buttress walls near the lift gates, concrete deterioration of the buttress walls themselves, and the structural cracking and vertical displacement at the Bay 6 - Spillway abutment contact are of particular concern.

Visual observations of the other appurtenances did not reveal conditions which would affect either their immediate safety or the safety of the dam. The deficiencies observed can be corrected during normal maintenance operations.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURE

Normal water surface is at or slightly above the top of the flashboards. Flow diversions occur through the Feeder Canal Intake Structure and through the South Bulkhead gates (a maximum diversion of 5000 cfs) for hydroelectric power generation.

4.2 MAINTENANCE OF DAM

Maintenance of the spillway portion of the dam has been minimal. Maintenance of the flashboards occurs annually and often times more frequently. Floating ice coming downriver during the early Spring removes sections of the flashboards, thereby requiring replacement and continuing maintenance. Fifty percent replacement is not uncommon and during the last few years, nearly entire replacement has been necessary.

4.3 MAINTENANCE OF APPURTENANT STRUCTURES

Maintenance of all of the appurtenant structures excluding the power station has also been minimal. However, the North Bulkhead structural member concrete deterioration and leakage problems requires more immediate attention. Maintenance of the lift-gate machinery has been minimal. The Intake Structure sluice gates are operational for regulating the Feeder Canal channel inflows. However, the tainter gate and needle dam operation is unknown although they appeared to be functioning properly. The head gates at the South Bulkhead controlling inflow to the forebay also appeared to be functioning properly.

4.4 WARNING SYSTEM IN EFFECT

No apparent warning system is present.

4.5 EVALUATION

Operation of the flow control sluice gates and head gates appears satisfactory. Maintenance of the flashboards is also satisfactory. Increased maintenance is required for the entire dam with primary emphasis placed on the entire North Bulkhead structure, including the structural concrete members, buttress walls, gates, and gate machinery. In addition, all masonry and concrete surfaces should be repaired as necessary.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is shown on the map titled "Drainage Area - Feeder Dam @ Glens Falls" (Appendix D). With the drainage area encompassing some 2801 square miles, the Hudson River main stem travels approximately 100 miles from its headwaters south of Lake Placid to the Feeder Dam site. Major tributaries to the Hudson River are the Cedar, Indian, Boreas, Schroon, and Sacandaga Rivers. Numerous lakes including Brant, Schroon, and Piseco lie within the basin as well as two major reservoirs; Indian Lake and the Sacandaga Reservoir. Over three-fourths of the basin lies within the Adirondack Mountain area where elevations rise to +5344 at Mount Marcy. Elevations of the existing ground at the Feeder Canal Intake Structure are near +290. Large areas of developed land relative to the size of the drainage basin are minimal, the largest municipality being Warrensburg.

5.2 ANALYSIS CRITERIA

No hydrologic/hydraulic information was available regarding the original design for this dam. Therefore, the analysis of the spillway capacity of the dam was performed using streamflow gaging station records (Appendix D) and data contained in a Corps of Engineers report entitled "Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models". The methodology described in this report employed the Corps of Engineers HEC-1 computer program in developing a model that correlated well with past known major storm events; i.e., the storms of October 1945, December 1948, and June 1972. No direct computer analysis using HEC-1 was performed. The spillway design flood selected for analysis was the PMF (Probable Maximum Flood) in accordance with recommended guidelines of the U.S. Army Corps of Engineers.

5.3 SPILLWAY CAPACITY

The single, concrete gravity, ogee spillway with the flashboards acts as the dam in forming the reservoir pool for the Feeder Canal Intake Structure and the hydroelectric power station. The 615 foot long overflow section includes an inclined logway, 20 feet long, that is located 175 feet from the North Bulkhead.

Discharges for the weirs and gates were computed using both weir and orifice flow relationships for the representative water surface elevations analyzed. The flashboards are designed for failure when the head reaches 1.5 to 2.0 feet above the top of the boards. Hence, all of the analyses performed assumes no flashboards exist. Maximum discharges through the hydroelectric power station existing machinery (5 units) was determined to be 5,000 cfs.

The spillway does not have sufficient capacity for discharging the peak outflow from one-half the PMF. For this storm event, the peak inflow and peak outflow is 149,500 cfs, whereas the PMF peak discharge is 299,000 cfs. The computed spillway capacity is 58,029 cfs.

5.4 RESERVOIR CAPACITY

The normal water surface is at or slightly above the top of the flashboards. Storage capacity for that water surface elevation is 7600 acre-feet. Without the flashboards, the storage capacity at the spillway crest is 6200 acre-feet. Storage capacity at the logway crest is 5200 acre-feet.

The total storage capacity to the top of dam (elevation [illegible].0) is 10,100 acre-feet. The limit of the reservoir pool i[illegible] [illegible]herman Island power station and diversion dam, located approximately 6.8 river miles upstream.

5.5 FLOODS OF RECORD

The maximum known discharge on the Hudson River was recorded upstream at the Spier Falls Dam on March 28, 1913 when a flow of 89,100 cfs was measured. The present Feeder Dam was under construction at the time and newspaper articles for the period indicate the dam site was flooded and only a small cofferdam washed out. The main cofferdam remained solid and withstood the floodwaters. The maximum recorded (gaged) flood occurred on April 12, 1922, when the water surface reached elevation 289.9. For this water level, the computed discharge is 56,876 cfs.

The flood of March 28, 1913 closely correlates with the Corps of Engineers HEC computer simulation of the 100-year event (90,000 cfs) for the Hudson River basin above the confluence of the Hudson and Sacandaga Rivers near Lake Luzerne (drainage area - 2708 square miles). Hence, if this flood of record were to occur again, the computed water surface elevation would be 292.45 and the present dam would be overtopped to a depth of 2.45 feet.

5.6 OVERTOPPING POTENTIAL

Analysis indicates the spillway does not have sufficient discharge capacity for either the PMF or one-half the PMF. The computed depths of overtopping are 13.3 feet and 6.2 feet respectively. All storms exceeding approximately 19% of the PMF would result in overtopping of the North Bulkhead and the South Abutment wall.

5.7 EVALUATION

The spillway capacity is inadequate for the peak outflow from one-half the PMF. For such a large storm event, a high tailwater condition would most likely occur resulting in the flooding of the downstream hazard areas. Hence, the spillway capacity is not considered to be seriously inadequate since dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just before overtopping failure.

Another reason why the spillway is not assessed as seriously inadequate is that the Corps of Engineers report does not properly consider the flood storage capability of Conklingville Dam at the Sacandaga Reservoir. This structure's primary purpose is flood control. The Hudson - Black River Regulating District operates this structure so that the water surface is at least 3 feet below the spillway crest. This three foot depth will provide about 75,000 acre-feet of storage. Prior to the Spring runoff period, the normal water surface is kept about 10 feet below the spillway crest. Further evidence in support of the flood control capability of this dam is that there has been no flow over the crest of the spillway since the structure was completed in 1930.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations of the spillway crest did not reveal any signs of major distress. Although the concrete surface was deteriorated, this condition was not so serious as to affect the stability of the dam.

The poor condition of the North Bulkhead could affect the integrity of this structure. Concrete deterioration of the buttress walls and structural cracking at the Bay 6 - spillway abutment contact are evidence of the weakened condition of this section of the dam. Visual observations of the remaining appurtenant structures did not reveal any other signs of major distress.

b. Design and Construction Data

No design computations or other data concerning the structural stability of the entire dam were available.

c. Data Review and Stability Evaluation

The NYS-DOT plans show a cross section of the spillway. A stabiltiy analysis was performed using the cross-section information shown, plus simplifying assumptions made in the analysis.

Analyses were performed assuming that the concrete key extending 4 feet into bedrock under the upstream toe was intact. A separate analysis was also performed assuming the concrete key separated from the dam and no longer functioned as part of the structure. Conditions analyzed were:

1) Normal conditions with the water level at the spillway crest elevation.

2) Conditions as in 1), plus a 10,000 lb/ft ice load.

3) Water level at the elevation of one-half PMF; a flow depth of 15 feet.

4) Conditions as in 3), but with the concrete key separated from the dam.

The safety factors for overturning and sliding for the spillway section only, obtained from the analyses are:

		FACTOR OF SAFETY	
	CONDITION	OVERTURNING	SLIDING
1)	Normal water level	21.40	38.22
2)	Ice load plus 1)	17.86	27.18
3)	One-half PMF	14.95	35.75
4)	One-half PMF; no key	1.45	18.06

The analyses indicate that the factors of safety for all conditions analyzed are acceptable. Only for condition 4 (one-half the PMF and the key under the upstream toe offering no passive resistance) does the factor of safety fall below the recommended guidelines.

The spillway was considered to be the critical portion of the dam for the stability analysis, since failure of this section would result in a substantial flood wave. While the North Bulkhead (section C-C on the as-built plans) appears to be a more critical section for stability considerations, failure of this portion of the dam would simply open the 6 lift gates without affecting the stability of the main dam.

d. Post Construction Changes

The changes to the entire river structure do not appear to have significantly altered the structural stability of the dam. The conversion of the former bypass and navigation lock into the present Feeder Canal Intake Structure occurred primarily within the limits of the bypass-lock structure. The construction of the hydroelectric power station adjoining the South Bulkhead buttresses the dam at the Spillway - South Bulkhead contact.

e. Seismic Stability

The dam is located in Seismic Zone 2. While the dam appears to be relatively stable, a seismic stability analysis was performed in accordance with the Corps of Engineer's guidelines. The seismic analysis was performed for normal conditions with the water level at the spillway crest. The safety factor against overturning with seismic considerations included is 20.58 and against sliding is 37.97.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase 1 inspection of the Feeder Dam did not reveal conditions which constitute an immediate hazard to human life or property. The North Bulkhead, however, does exhibit significant deficiencies and deterioration that could affect its future structural integrity. The spillway and appurtenant structures, are not presently considered to be unstable.

The spillway capacity, although not having sufficient discharge capacity for passing one-half the PMF, is considered to be inadequate. During periods of unusually heavy precipitation, continuous surveillance should be provided both at the dam (especially at the North Bulkhead) and in the downstream areas to warn of hazardous flooding conditions. Such surveillance procedures and other measures should be documented in a detailed emergency-operation plan for the dam. Also, a warning system should be developed and placed in readiness for future use.

b. Adequacy of Information

The information available appears to be adequate for the purposes of the Phase 1 inspection.

c. Urgency

The deficiencies occurring at the North Bulkhead require priority remedial action in order to prevent further deterioration of this part of the dam. Such remedial action and corrective measures should be completed prior to the next period of anticipated high river flows (Spring 1980). Since the deficiencies at the 615 foot long spillway-overflow section encompass the entire concrete surface, secondary emphasis should be placed on rehabilitating this portion of the dam also. Such remedial measures should be completed following the restoration of the North Bulkhead. All other deficiencies observed during the visual inspection can be corrected during normal maintenance operations.

d. Necessity for Additional Investigations

Further structural analysis of the North Bulkhead to ascertain the integrity of this part of the entire dam is recommended. In addition, information regarding the location and top elevations of the former removed dam with respect to the existing structure is desireable since no such information presently exists.

7.2 RECOMMENDED MEASURES

The following actions should be undertaken:

A) North Bulkhead:

1) Eliminate the leakage through all concrete members.

2) Rehabilitate the deteriorated concrete buttress walls.

3) Repair the structural cracking and vertical displacement of the Bay 6 top slab - spillway abutment contact.

4) Rehabilitate the lift-gate machinery so as to make them operable.

5) Rehabilitate all deteriorated and cracked concrete surfaces.

6) Eliminate the leakage through the gates themselves.

B) Other:

7) Perform periodic operation and maintenance on the tainter gate, needle dam, and the canal sluice gate hoist machinery.

8) Establish and maintain an operating mechanism for the South Bulkhead gates.

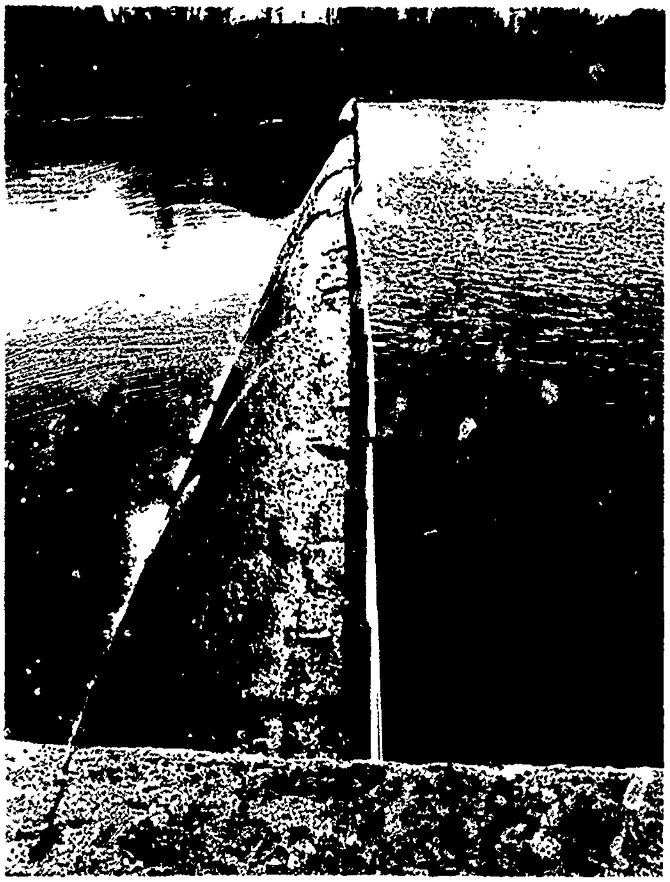
9) Rehabilitate all deteriorated and cracked concrete surfaces.

10) Develop and implement a detailed emergency-operation plan and warning system.

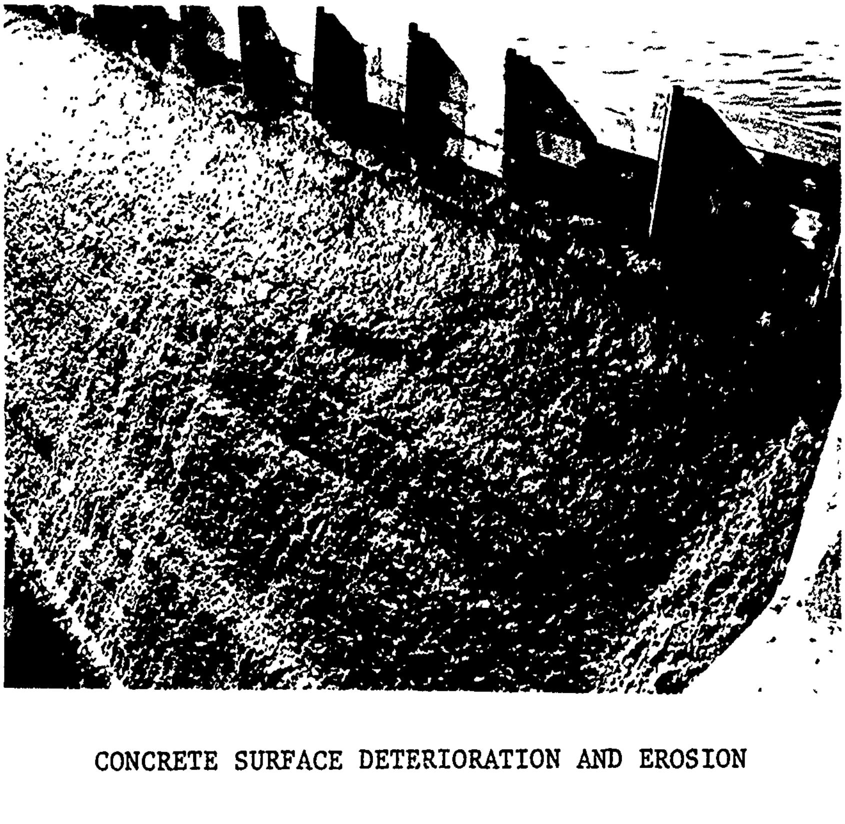
11) As a result of the completed additional investigations, further remedial measures deemed necessary should be completed within two years of the date of this report.

APPENDIX A

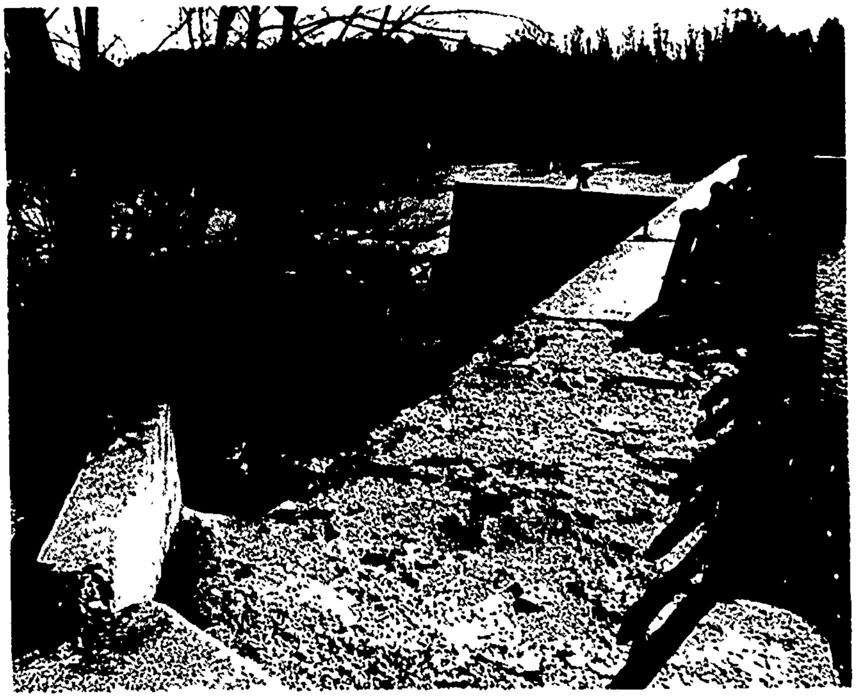
PHOTOGRAPHS



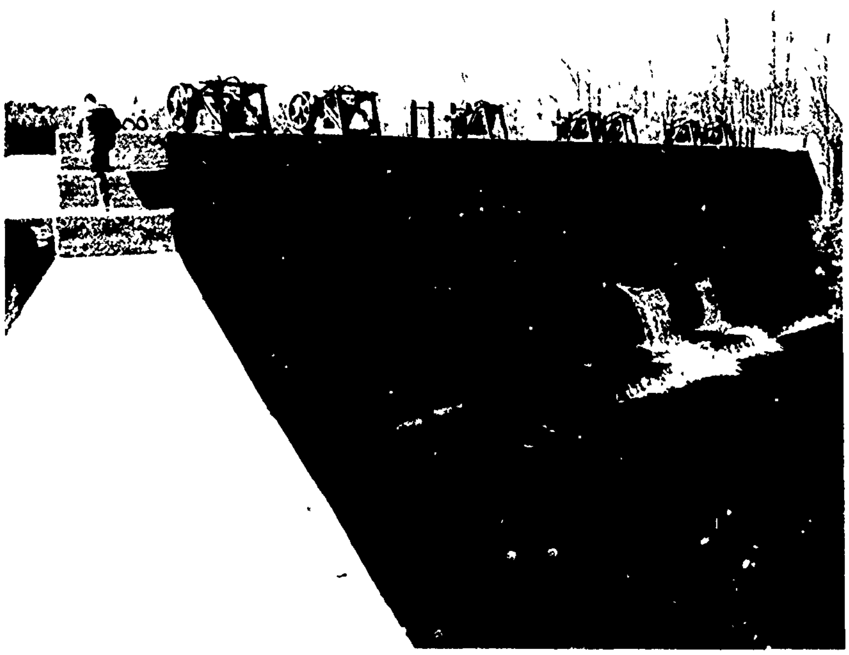
FEEDER DAM SPILLWAY WITH FLASHBOARDS
(Looking South)



CONCRETE SURFACE DETERIORATION AND EROSION

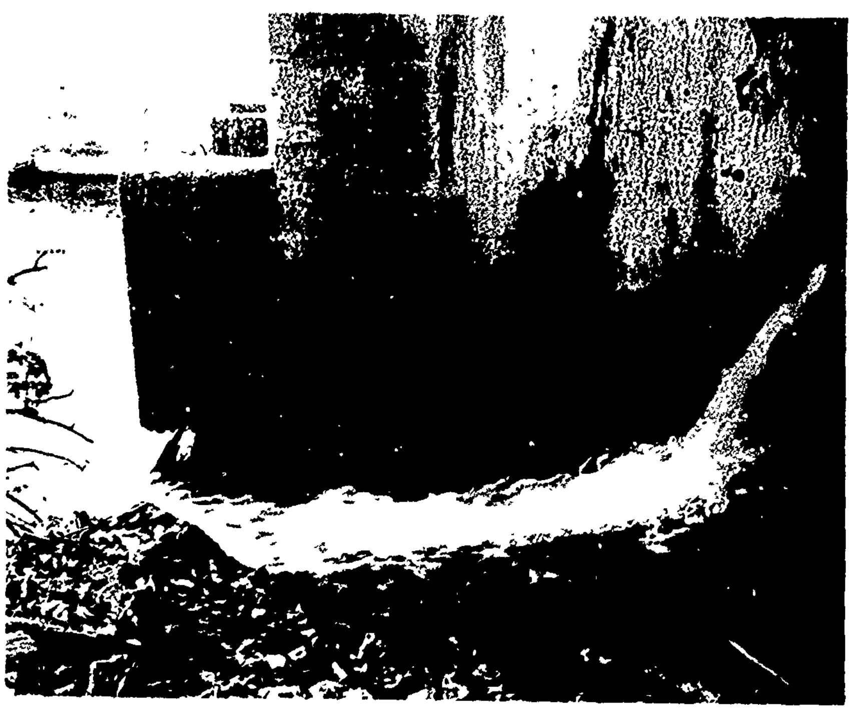


NORTH BULKHEAD (Looking South)



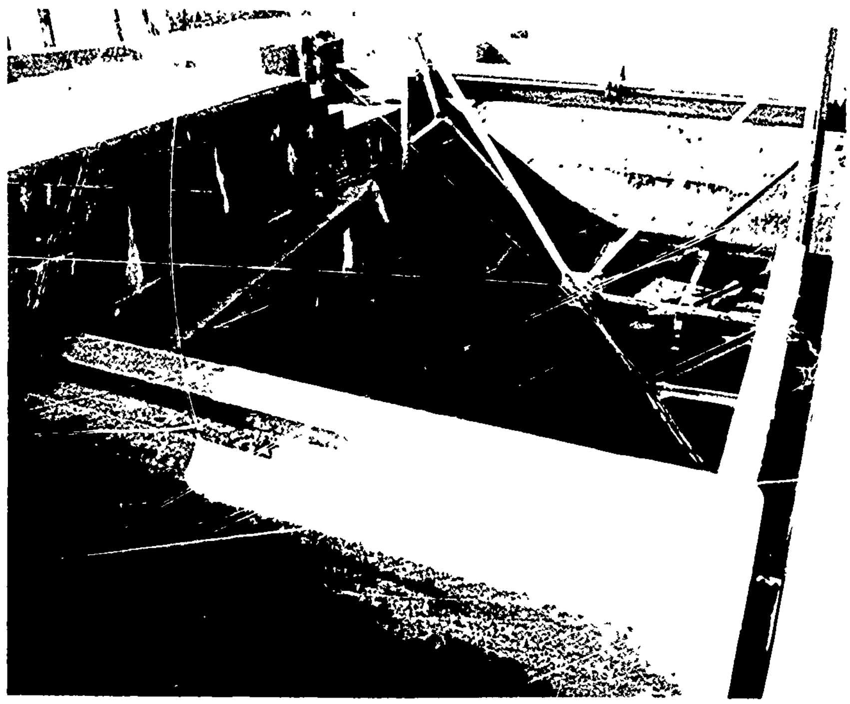
NORTH BULKHEAD
(Note-flow occurring from lealage through the structure)

BUTTRESS WALL 1/2 - LEAKAGE THRU CONCRETE
(North Side)



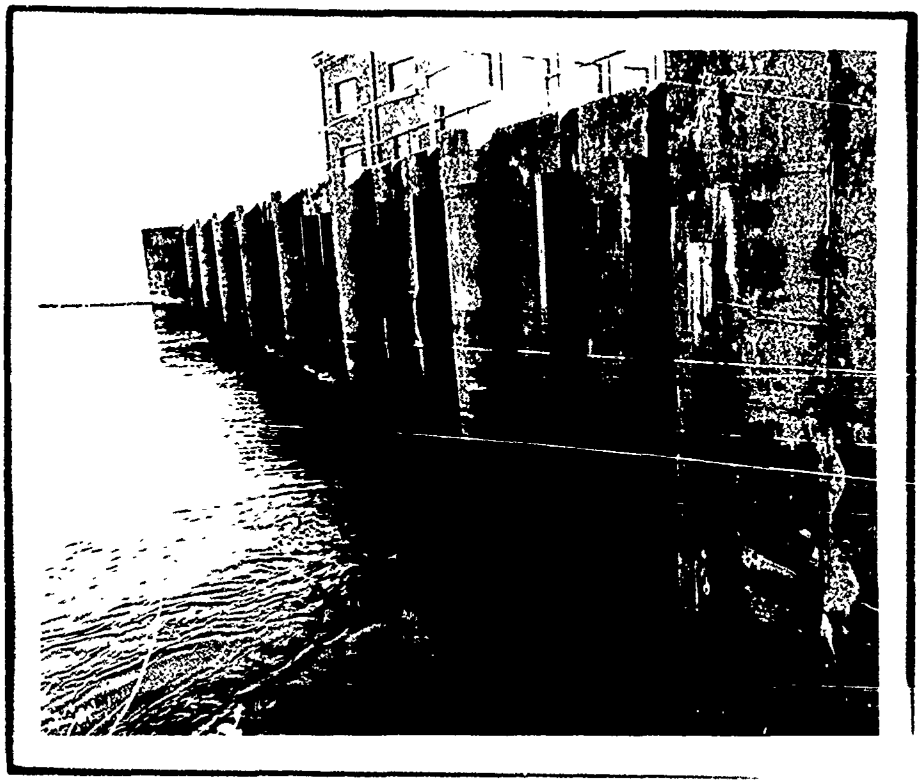
BUTTRESS WALL 1/2 - LOSS OF THICKNESS
(North Side)

BAY 6 - SPILLWAY ABUTMENT CONTACT
(Note - Structural cracking)

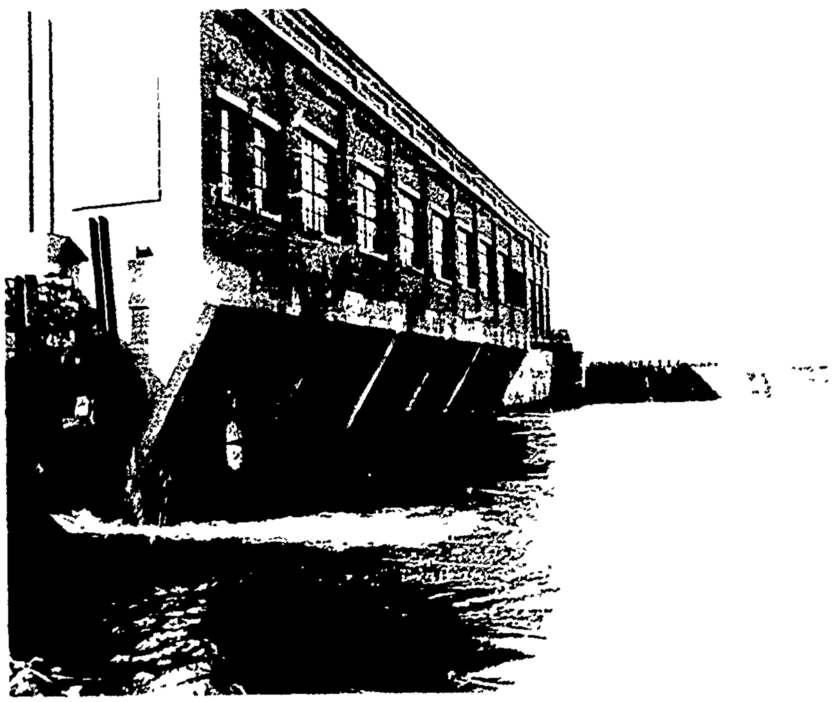


FEEDER CANAL INTAKE STRUCTURE - TAINTER GATE

FEEDER CANAL DISCHARGE CONTROL STRUCTURES



SOUTH BULKHEAD WITH GATES
(Looking North)



HYDROELECTRIC POWER STATION TAILRACE
AND ICE SLUICE

APPENDIX B

ENGINEERING DATA CHECKLIST

Check List
Engineering Data
Design Construction Operation

Name of Dam FEEDER DAM @ GLENS FALLS
I.D. # NY-143 (378-UH)

Item	Remarks		
	Plans	Details	Typical Sections
Dam	YES	YES	YES
Spillway(s)	YES	YES	YES
Outlet(s)	YES	YES	YES
Design Reports	NO		
Design Computations	NO		
Discharge Rating Curves	NO		
Dam Stability	NO		
Seepage Studies	NO		
Subsurface and Materials Investigations	NO		

FEEDER DAM @ GLENS FALLS

Item	Remarks
Construction History	LIMITED TO (1916 & 1923 DAM INSPECTION REPORTS)
Surveys, Modifications, Post-Construction Engineering Studies and Reports	MODIFICATIONS: FEEDER CANAL INTAKE STRUCTURE HYDROELECTRIC POWER STATION
Accidents or Failure of Dam Description, Reports	NONE
Operation and Maintenance Records Operation Manual	MEAN DAILY WATER LEVEL RECORDS @ ENTRANCE TO FEEDER CANAL (10/1916 TO 6/1961)

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam FEEDER DAM @ GLENS FALLS

I.D. # NY-143

Location: Town QUEENSBURY / MOREAU County WARREN - SARATOGA

Stream Name HUDSON RIVER

Tributary of N/A

Latitude (N) 43°-17'-30" Longitude (W) 73°-40'-00"

Hazard Category C

Date(s) of Inspection 11/2/78

Weather Conditions ±45° CLEAR

b. Inspection Personnel R. WARRENDER W. LYNICK

c. Persons Contacted J. HUNTINGTON (NYSDOT REGION ONE - WATERWAYS) W. CULLIGAN NYSDOT - WATERWAYS SUBDIV. (MAIN OFFICE)

d. History:

Date Constructed 1913

Owner NYS-DOT WATERWAYS MAINT. SUBDIVISION

Designer NYS DEPT. OF PUBLIC WORKS (NOW NYSDOT)

Constructed by NYS DEPT. OF PUBLIC WORKS

2) Technical Data

Type of Dam CONCRETE GRAVITY DAM W/ APPURTENANT STRUCTURES

Drainage Area 2801 SQ. MILES

Height 36' Length 615'(+)

Upstream Slope N/A Downstream Slope N/A

2) Technical Data (Cont'd.)

External Drains: on Downstream Face N/A @ Downstream Toe N/A

Internal Components:

Impervious Core N/A

Drains NONE

Cutoff Type N/A

Grout Curtain NONE

4) Instrumentation

(1) Monumentation/Surveys WATER SURFACE STAFF GAGE ABOVE THE DAM - ATTACHED @ FEEDER CANAL INTAKE STRUCTURE

(2) Observation Wells NONE

(3) Weirs NONE

(4) Piezometers NONE

(5) Other

5) Reservoir

a. Slopes N/A HUDSON RIVER SHORELINE ; TREES & BRUSH TO RIVER'S EDGE

b. Sedimentation N/A

6) Spillway(s) (including Discharge Conveyance Channel)

WITH FLASHBOARDS (2.9' HIGH) CONCRETE GRAVITY STRUCT.

a. General

b. Principle Spillway HORIZ & VERTICAL ALIGNMENT - SATISFACTORY
FLASHBOARDS - BOWED IN 3 LOCATIONS ; RELATIVELY NEW & IN SATISFACTORY CONDITION

c. Emergency or Auxiliary Spillway NONE

d. Condition of Discharge Conveyance Channel - HUDSON RIVER ; SATISFACTORY

e. Stability of Channel side/slopes N/A

7) Downstream Channel

HUDSON RIVER

a. Condition (debris, etc.) SATISFACTORY TREES & BRUSH GROW TO RIVER'S EDGE

b. Slopes N/A

c. Approximate number of homes CITIES OF SOUTH GLENS FALLS & GLENS FALLS

8) Reservoir Drain/Outlet

Type: Pipe ______ Conduit ______ Other NONE

Material: Concrete ______ Metal ______ Other ______

Size: ______ Length ______

Invert Elevations: Entrance ______ Exit ______

Physical Condition (describe): Unobservable ______

Material: ______

Joints: ______ Alignment: ______

Structural Integrity: ______

Hydraulic Capability: ______

Means of Control: Gate ______ Valve ______ Uncontrolled ______

Operation: Operable ______ Inoperable ______ Other ______

Present Condition (describe): ______

9) Structural

a. Concrete Surfaces SPILLWAY CREST - UNEVEN DETERIORATED SURFACE : NO SMOOTH CONC. AREA REMAINING ; 2 LARGE EROSION DEPRESSIONS NORTH OF LOGWAY
AGGREGATE HOLES - VISIBLE

SURFACE DETERIORATION - TOP SLAB @ BAY 1
NORTH BULKHEAD BASE SLAB - DETERIORATION SIMILAR TO SPILLWAY CREST
LESSER AREAS OF SPALLING ON ALL CONCRETE SURFACES

b. Structural Cracking NORTH BULKHEAD TOP SLAB - @ MIDPTS & @ ENDS OF EACH BAY ; ALSO BETWEEN ANCHOR BOLTS FOR GATE MACHINERY
OTHER SURFACE CRACKING ON CONCRETE SURFACES
SIGNIFICANT @ BAY 6 - SPILLWAY ABUTMENT CONTACT (ALSO SETTLEMENT)

c. Movement - Horizontal & Vertical Alignment (Settlement)

BAY 6 - SPILLWAY ABUTMENT CONTACT — VERTICAL DISPLACEMENT

d. Junctions with ~~Abutments or~~ Embankments SOME SOIL EROSION @ SOUTH ABUTMENT WALL @ RIVER'S EDGE (NO EFFECT ON WALL)
SPILLWAY JUNCTION W/ NORTH BULKHEAD - SATISFACTORY
W/ SOUTH BULKHEAD - UNKNOWN

e. Drains - Foundation, Joint, Face N/A

f. Water passages, conduits, sluices NORTH BULKHEAD - SIGNIFICANT LEAKAGE THRU CONCRETE BUTTRESS WALLS BETWEEN GATES ; GATE MACHINERY - INOPERATIVE AND/OR NON-EXISTENT
FEEDER CANAL INTAKE STRUCTURE - TAINTER GATE, NEEDLE DAM ; SLUICE GATES SATISFACTORY
SOUTH BULKHEAD (INTO FOREBAY) - SATISFACTORY ; NO GATE MACHINERY

g. Seepage or Leakage FLASHBOARDS - MINOR
NORTH BULKHEAD - SIGNIFICANT ; THRU CONCRETE ; THRU WOOD GATES
FEEDER CANAL (CHANNEL) - ALONG MASONRY RIVER-SIDE WALL , @ SLUICE-GATE WELL DOWNSTREAM OF DAM

h. Joints - Construction, etc. N/A

i. Foundation NORTH BULKHEAD BASE SLAB - CONCRETE DETERIORATION SIMILAR TO SPILLWAY CREST SURFACE (AGGREGATE HOLES)

j. Abutments NORTH & SOUTH ABUTMENT WALLS - SATISFACTORY

k. Control Gates NORTH BULKHEAD - INOPERATIVE AND/OR NON-EXISTENT
SOUTH BULKHEAD - NON-EXISTENT
FEEDER CANAL INTAKE STRUCTURE - FUNCTIONING SATISFACTORILY

l. Approach & Outlet Channels N/A

m. Energy Dissipators (plunge pool, etc.) NONE

n. Intake Structures N/A

o. Stability N/A

p. Miscellaneous

APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

FEEDER DAM @
GLENS FALLS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA: BARGE CANAL DATUM - BCD

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam (NORTH BULKHEAD)	290.0	493	10100
2) Design High Water (Max. Design Pool)	N/A		
3) Auxiliary Spillway Crest	N/A		
4) Pool Level with Flashboards	284.9	493	7600
5) Service Spillway Crest	282.0	493	6200

DISCHARGES

	Volume (cfs)
1) Average Daily	N/A
2) Spillway @ Maximum High Water (WITHOUT FLASHBOARDS)	58000
3) Spillway @ Design High Water	N/A
4) Spillway @ Auxiliary Spillway Crest Elevation	N/A
5) Low Level Outlet	N/A
6) Total (of all facilities) @ Maximum High Water	
7) Maximum Known Flood (RECORDED)	56800
8) HYDROELECTRIC POWER STATION MACHINERY (5 UNITS)	5000 (MAX)

CREST: ELEVATION: 290.0 (BCD)

Type: CONCRETE GRAVITY (INCL - SPILLWAY, NORTH BULKHEAD, FEEDER CANAL INTAKE STRUCTURE, NORTH ABUTMENT WALL, SOUTH BULKHEAD, SOUTH ABUTMENT WALL)

Width: VARIABLE Length: 1044'

Spillover CREST OF SPILLWAY

Location CENTER

SPILLWAY:

PRINCIPAL		EMERGENCY
282.0 (BCD)	Elevation	
OGEE ; CONCRETE GRAVITY w/ FLASHBOARDS	Type	NONE
	Width	
	Type of Control	
✓	Uncontrolled	
	Controlled:	
2.9' FLASHBOARDS (NOT @ LOGWAY)	Type (Flashboards; gate)	
CONTINUOUS ACROSS CREST	Number	
615'	~~Size~~/Length	
	Invert Material	
	Anticipated Length of operating service	
N/A	Chute Length	
>6'	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

OUTLET STRUCTURES/~~EMERGENCY DRAWDOWN FACILITIES:~~

Type: Gate ✓ Sluice ✓ Conduit ____ Penstock ____

Shape : NORTH BULKHEAD ; FEEDER CANAL INTAKE STRUCTURE ; SOUTH BULKHEAD

Size: SEE DRAWINGS

Elevations: Entrance Invert ____

Exit Invert ____

Tailrace Channel: Elevation - RIVER BOTTOM

HYDROMETEROLOGICAL GAGES:

Type : STAFF GAGE ~~STAFF GAGE @ FEEDER CANAL INTAKE STRUCTURE~~

Location: SPIER FALLS DAM

Records: (USGS)

Date - 10/1912 TO 3/1923 ~~10/1916 TO 6/1961~~

Max. Reading - 89,100 cfs 3/28/1913 ~~289.9 4/12/1922~~

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

Method of Controlled Releases (mechanisms):

NONE

DRAINAGE AREA: 2801 SQ MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: 3/4(+) OF AREA IN ADIRONDACK MOUNTAIN AREA

Terrain - Relief: ELEVATIONS (+5344 TO +290 @ DAM)

Surface - Soil: VARIES

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

N/A SACANDAGA LAKE (CONKLINGVILLE DAM) FLOOD STORAGE - ATTENUATION

Potential Sedimentation problem areas (natural or man-made; present or future)

N/A

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

N/A

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: N/A

Elevation:

Reservoir:

Length @ Maximum Pool 6.8± (Miles)

Length of Shoreline (@ Spillway Crest) N/A (Miles)

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	1/		
SUBJECT		**COMPUTED BY**	**DATE**
DRAINAGE AREA ADJUSTMENT - H & H		GCL	4/9/79

DRAINAGE AREA:

WSP # 1302 GAGE # 46 @ SPIER FALLS DAM DA = 2779 SQ MILES

GAGE # 47 IS IN THE FEEDER CANAL

MAX. Q: 89,100 cfs ON 3/28/1913 OR (32.06 csm)

USGS 7.5' QUAD SHTS: CONTRIBUTING AREA TO FEEDER DAM BELOW SPIER FALLS DAM

SCALE: 1:24000
1" = 2000'
1 SQ IN = 91.827 ACRES

QUAD SHT	(PLANIMETERED) AREA	
CORINTH	5.73"	
GANSEVOORT	10.39"	
LAKE LUZERNE	8.09"	18.52"
	0.03"	
	10.40"	
GLENS FALLS	39.00"	122.34"
	34.41"	
	5.48"	
	31.80"	
	11.65"	

TOTAL: 156.95 SQ IN → 14415 ACRES → 22.52 SQ MILES

USE 22 SQ MI. ←

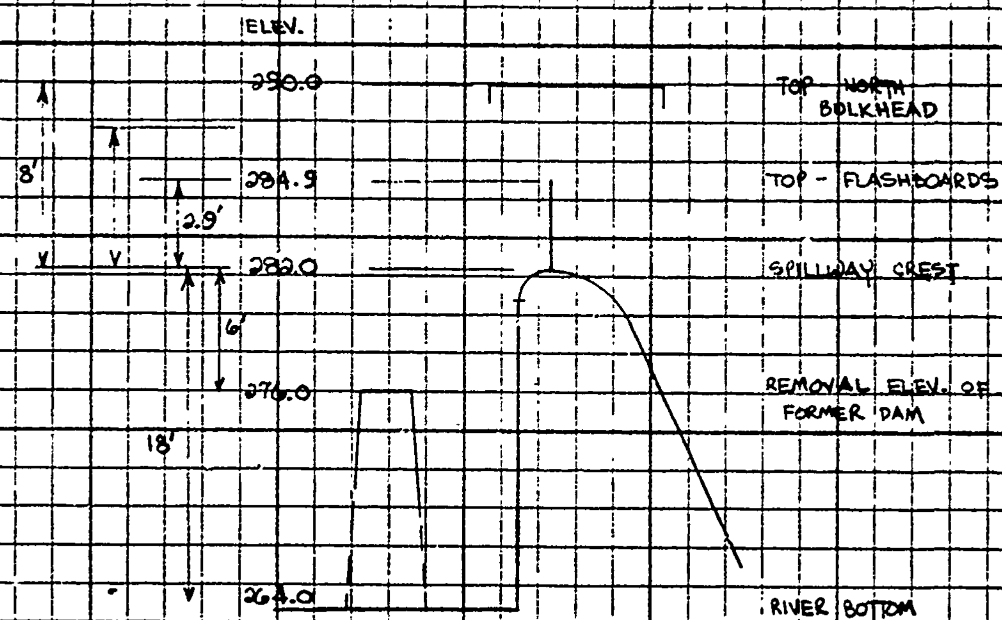
∴ DRAINAGE AREA (FEEDER DAM) = 2801 SQ MILES ←

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	21		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGE COEFFICIENT - SPILLWAY CREST		[illegible]	4/5/79

REF: USBUREC - DESIGN OF SMALL DAMS (1977)
FIG. 249 & 250



ANALYSIS CONDITIONS:

1) $P = 18$ $H_o = 8$ $P/H_o = 2.25$ $C_o = 3.94$

$P = 6$ $H_o = 8$ $P/H_o = 0.75$ $C_o = 3.86$

NIAGARA-MOHAWK POWER CORP:
FLASHBOARDS ARE DESIGNED FOR FAILURE WITH A HEAD OF 18" - 24" (USE 24")
∴ DESIGN HEAD (FLASHBOARDS) = 286.9 (USE 287.0)

2) $P = 18$ $H_o = 5$ $P/H_o = 3.60$ $C_o = 3.95+$ (OFF FIG. 249)

$P = 6$ $H_o = 5$ $P/H_o = 1.20$ $C_o = 3.90$

DESIGN HIGHWATER = 287.0
DESIGN HEAD, H_o = 5
FOR P = 6
(DESIGN) DISCHARGE COEFF. C_o = 3.90

Q_p = 26816 cfs

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	3/		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGE COEFFICIENT (VARIATION WITH HEAD) - SPILLWAY CREST (ONLY)		DCL	4/10/79

USBUREC (1977) - FIG 250

$Q = CLH^{3/2}$

$H_o = 5$ $C_o = 3.90$ (NO FLASHBOARDS) L = 415'

	STAGE	DEPTH FLOW (H_e)	H_e/H_o	C/C_o	DISCHARGE COEFF. (C)	Q (cfs)
	292.0	10	— (OFF FIG. 250) —		4.2	81682
TOP OF NORTH BULKHEAD	290.0	8	1.6	1.07	4.17	58029
	289.9	7.9	1.58	1.068	4.165	56876
	289.0	7	1.4	1.048	4.09	46585
	288.0	6	1.2	1.026	4.00	36154
	286.0	4	0.8	0.97	3.78	18598
	284.9	2.9	0.58	0.934	3.64	11055
	283.0	1	0.2	0.852	3.32	2041.8
	282.0	0	—	0.8	3.12	0

[FIG 249: MINIMUM C_o FOR THIS SHAPE CREST IS 3.1

CONTINUED:

STAGE		C	Q (cfs)
297.0	15	4.2	150059
296.0	14		135306
295.0	13		121071
294.0	12		107373
293.0	11	4.2	94235

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	4/		
SUBJECT: SIMULATION DATA - STANDARD PROJECT FLOOD (SPF)		COMPUTED BY: WCL	DATE: 4.10.79

"UPPER HUDSON & MOHAWK RIVER BASINS HYDROLOGIC FLOOD ROUTING MODELS"

1) DRAINAGE BASIN — UPPER HUDSON TO A POINT JUST BELOW THE CONFLUENCE OF SACANDAGA & HUDSON RIVERS

TOTAL AREA = 2722 SQ MILES

CONTROL POINT	HYDROGRAPH VALUE (CFS)	
1044	(PEAK) 128420	103772
1047	42314	44739 (PEAK)
(TOTAL)	170734	148511

1048 = (1044 + 1047) 154540 cfs (PEAK) (SPF)

(56.77 CSM)

2) DRAINAGE BASIN - BELOW 1048 TO GLENS FALLS (POSSIBLY NOT FEEDER DAM)

SUBBASIN AREA = 84 SQ MILES 23834 (PEAK) HYDROGRAPH VALUE
#257

CONTROL POINT	PEAK FLOW	
1257	149705 cfs	(SPF)

AREA = 2806 SQ MILES (53.36 CSM)

3) FIG. 6.52: DRAINAGE AREA VS PEAK DISCHARGE (SPF-CURVE)

FOR AREA = 2800 SQ MILES PEAK = 55 CSM

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	5/		
SUBJECT		**COMPUTED BY**	**DATE**
SIMULATION IV A — PMF DETERMINATION		[illegible]	4/10/79

SPS RAINFALL - 9.5" (SIMULATION)

SPF RAINFALL (SUBBASIN #257) + 12.5"

TRANSPOSED AGNES RAINFALL - 13.1" ← OVER ENTIRE BASIN MAX - 17" AND 15" ; MIN - 10"

DEC. 1948 STORM RAINFALL - 8" MAX

JUN. 1972 STORM - 5" MAX.

PMP RAINFALL - (NWS TP-40) - 20"-21"
(10 SQ MILE - 6 HR)

PMP RAINFALL - (HRR #33) - 18.2" (200 SQ MILE - 24 HR)
78% (1000 SQ MI - 24 HR) - 14.2"
86% (- 48 HR) - 15.6"

PMF ≈ 2 x SPF

FOR PMF OUTFLOW:

FOR 2801 SQ MILES @ 53.36 CSM X 2 = 298923 cfs

USE 299,000 cfs ←

1/2 PMF = 149,500 cfs ←

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	6/		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGE COEFFICIENTS - APPURTENANT STRUCTURES		JCL	1/16/79

RE: HANDBOOK OF HYDRAULICS
KING & BRATER 5TH EDITION
(pg 5-24)

ALL - BROAD CRESTED WEIRS

USE C = 3.087
FOR OVERTOPPING

NORTH BULKHEAD:
TOP - 290.0
LENGTH - 114'
WIDTH - 8' @ GATE
10' @ BUTTRESS WALL

FEEDER CANAL INTAKE STRUCTURE:
TOP - 292.0
LENGTH - 64'
WIDTH - > 10'

NORTH ABUTMENT WALL:
TOP - 292.0
LENGTH - 65'
WIDTH - > 5'

SOUTH BULKHEAD:
TOP - 297.0
LENGTH - 151'
WIDTH - 8' @ GATE
10' @ BUTTRESS WALL

SOUTH ABUTMENT WALL:
TOP - 290.0
LENGTH - 35'
WIDTH - 3' (+ EXISTING GROUND)

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	7		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGES - APPURTENANT STRUCTURES		JCL	4/2/79

$Q = CLH^{3/2}$ (SEE SHT 6-L) (SPILLWAY DISCHARGES SHT 3)

C = 3.087 ALL STRUCTURES (FOR OVERTOPPING)

STAGE	NORTH BULKHEAD	FEEDER CANAL INTAKE STRUCTURE	NORTH ABUTMENT WALL	SOUTH BULKHEAD	SOUTH ABUTMENT WALL (INTO FOREBAY)	TOTAL DISCHARGE
TOP	290.0	292.0	292.0	297.0	290.0	
290.0	0	0	0	0	0	0
291.0	(1) 352	0	0	0	(1) 108	460
292.0	(2) 995	0	0	0	(2) 306	1301
293.0	(3) 1829	(1) 198	(1) 201	0	(3) 561	2789
294.0	(4) 2815	(2) 559	(2) 568	0	(4) 864	4806
295.0	(5) 3935	(3) 1027	(3) 1043	0	(5) 1208	7213
296.0	(6) 5172	(4) 1581	(4) 1605	0	(6) 1528	9946
297.0	(7) 6518	(5) 2209	(5) 2243	0	(7) 2001	12971

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	8/		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGES THRU BULKHEAD GATES		[illegible]	[illegible]

SOUTH BULKHEAD

#GATES = 8

AREA (EACH) = 202.5 ft^2

SIZE: 13.5' H x 15' W

TOP ELEV. = 283.5

BOTTOM " = 270.0

NORTH BULKHEAD

#GATES = 6

AREA (EACH) = 111.9 ft^2

SIZE: 7.5' H x 14.92' W

TOP ELEV. = 283.5

BOTTOM " = 276.0

FLOW EQUATIONS:

WEIR FLOW $Q = CLH^{3/2}$ WHERE $L = L' - 2(NK_p + K_a)H_e$ $C = 2.63$

HANDBOOK OF HYDRAULICS 5TH ED. TABLE 5-3

ROUND-NOSED PIERS $K_p = 0.01$

ABUTMENT EFFECT $K_a = 0$ (ROUNDED ABUTMENTS)

ORIFICE FLOW (SUBMERGENCE) $Q = CA\sqrt{2gH}$ WHERE $C = 0.6$

H – MEASURED TO ℄ ELEV. OF ORIFICE

SOUTH BULKHEAD

$L' = 120'$ $N = 7$

$\therefore L = 120 - 2[(7)(.01) + 0]H_e$

$\rightarrow L = 120 - 0.14H_e$

$C = 2.63$

NORTH BULKHEAD

$L' = 89.5'$ $N = 5$

$\therefore L = 89.5 - 2[(5)(.01) + 0]H_e$

$\rightarrow L = 89.5 - (0.1)H_e$ ←

$C = 2.63$

STAGE	H_e	L	Q (cfs)	STAGE	H_e	L	Q (cfs)	TOTAL DISCHARGE
270.0	0	—	0					0
272.0	2	119.72	891					891
274.0	4	119.44	2513					2513
276.0	6	119.16	4606	276.0	0	—	0	4606
278.0	8	118.88	7075	278.0	2	89.3	664	7739
280.0	10	118.60	9864	280.0	4	89.1	1875	11739
282.0	12	118.32	12936	282.0	6	88.9	3436	16372
283.5	13.5	118.11	15408	283.5	7.5	88.75	4794	20202

WEIR FLOW ↑

ORIFICE FLOW ↓

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	9/		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGES THRU BULKHEAD GATES		[illegible]	4/16/79

$Q = CA\sqrt{2gH}$ (SUBMERGENCE)

$C = 0.6$

SOUTH BULKHEAD
A = 202.5 ft² (EACH)
# GATES = 8
℄ ELEV = 276.75

WEIR FLOW

NORTH BULKHEAD
A = 111.9 ft² (EACH)
# GATES = 6
℄ ELEV. = 279.75

ORIFICE FLOW

STAGE	H	Q	8Q	STAGE	H	Q	6Q	TOTAL DISCHARGE
283.5	6.75	2533	20264	283.5	3.75	1043	6258	26522
284.0	7.25	2625	21000	284.0	4.25	1111	6666	27666
284.9	8.15	2784	22272	284.9	5.15	1223	7338	29610
286.0	9.25	2965	23720	286.0	6.25	1347	8082	31802
288.0	11.25	3270	26160	288.0	8.25	1548	9288	35448
289.0	12.25	3413	27304	289.0	9.25	1639	9834	37138
290.0	13.25	3549	28392	290.0	10.25	1725	10350	38742
291.0	14.25	3681	29448	291.0	11.25	1807	10842	40290
292.0	15.25	3808	30464	292.0	12.25	1886	11316	41780
293.0	16.25	3930	31440	293.0	13.25	1961	11766	43206
294.0	17.25	4050	32400	294.0	14.25	2034	12204	44604
295.0	18.25	4165	33320	295.0	15.25	2104	12624	45944
296.0	19.25	4278	34224	296.0	16.25	2172	13032	47256
297.0	20.25	4388	35104	297.0	17.25	2238	13428	43532

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	10/		
SUBJECT: DISCHARGES THRU SLUICE GATES (FEEDER CANAL INTAKE STRUCTURE)		COMPUTED BY: WCL	DATE: 4/10/79

SLUICE GATES

\# GATES = 2

AREA (EACH) = 48 ft^2

SIZE: 8'H x 6'W

TOP ELEV. = 287.5

BOTTOM ELEV. = 279.5

FLOW EQUATIONS:

WEIR FLOW $Q = CLH^{3/2}$ WHERE $L = L' - 2K_a H$ $C = 2.63$

$L = L' - 0.4H$

ABUTMENT EFFECT $K_a = 0.2$

ORIFICE FLOW (SUBMERGENCE) $Q = CA\sqrt{2gH}$ WHERE $C = 0.6$

H - MEASURED TO ℄ ELEV. OF ORIFICE

STAGE	H	L	Q(cfs)		2Q
279.5	0	—	0		0
280.0	0.5	5.8	5.4	WEIR FLOW	10.8
282.0	2.5	5.0	52		104
283.5	4.0	4.4	93		186
284.0	4.5	4.2	105		210
284.9	5.4	3.84	127		254
286.0	6.5	3.4	148		296
287.5	8.0	2.8	167		334
		ORIFICE H:		ORIFICE FLOW	
288.0	8.5	4.5	490		980
289.0	9.5	5.5	542		1084
290.0	10.5	6.5	589		1178
292.0	12.5	8.5	674		1348

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	11		
SUBJECT		**COMPUTED BY**	**DATE**
OVERTOPPING - DEPTHS OF FLOW		WCL	4/16/79

CONDITIONS:

ALL GATES - CLOSED NO FLASHBOARDS WEIR FLOW - OVERTOPPING

TOTAL DISCHARGE (cfs)				145,253	148,745	149,500	150,503	298,726	299,000	301,145
SOUTH ABUTMENT WALL	L = 35'	C = 3.087	290.0	1588	1668	6.2'	1709	5241	13.3'	5300
SOUTH BULKHEAD	L = 151'	C = 3.087	297.0	—	—	0	—	7371	6.3'	7547
SPILLWAY	L = 615'	C = 4.2	282.0	135306	138216	14.2'	139678	253918	21.3'	255708
NORTH BULKHEAD	L = 114'	C = 3.087	290.0	5172	5433	6.2'	5565	17069	13.3'	17262
FEEDER CANAL INTAKE STRUCTURE	L = 64'	C = 3.087	292.0	1581	1701	4.2'	1762	7505	11.3'	7605
NORTH ABUTMENT WALL	L = 65'	C = 3.087	292.0	1605	1727	DEPTH: 4.2'	1789	7622	DEPTH: 11.3'	7723
STAGE:				296.0	296.2	1/2 PMF	296.3	303.3	PMF	303.4

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM @ GLENS FALLS	12/		
SUBJECT: RESERVOIR - STORAGE CAPACITY		COMPUTED BY: JCL	DATE: 4/16/79

USGS 7.5' QUAD SHT:

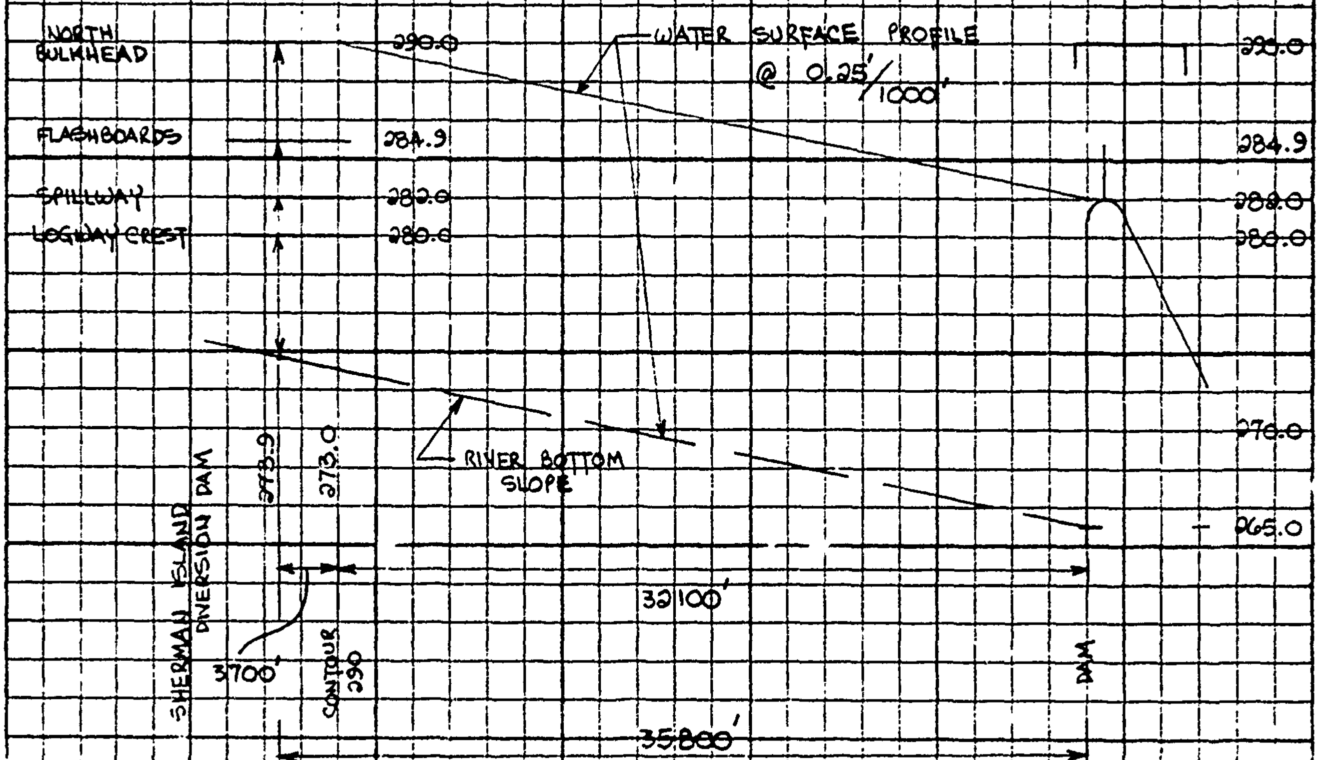
CONTOUR 290 (NEAR SHERMAN ISLAND POWERPLANT) }
ELEVATION 282 (SPILLWAY CREST) } DISTANCE = 32100'

$\Delta h = 8'$ $\qquad \frac{8'}{32100} = 0.000249$

AVERAGE WIDTH ≈ 600' $\qquad = 0.25'/1000'$ (SLOPE)

ELEVATIONS (RIVER BOTTOM): $\qquad \boxed{\text{USE } 265.0}$

NORTH BULKHEAD - 264.0 $\qquad$ SOUTH BULKHEAD - 265.0



STORAGE CAPACITY:

LOGWAY CREST -

$$V = \left(\frac{6.1 + 15}{2}\right)\frac{(35800)(600)}{43560}$$

$V = 5202$ ACRE-FT

SPILLWAY CREST -

$$V = \left(\frac{8.1 + 17}{2}\right)\frac{(35800)(600)}{43560}$$

$V = 6189$ ACRE-FT

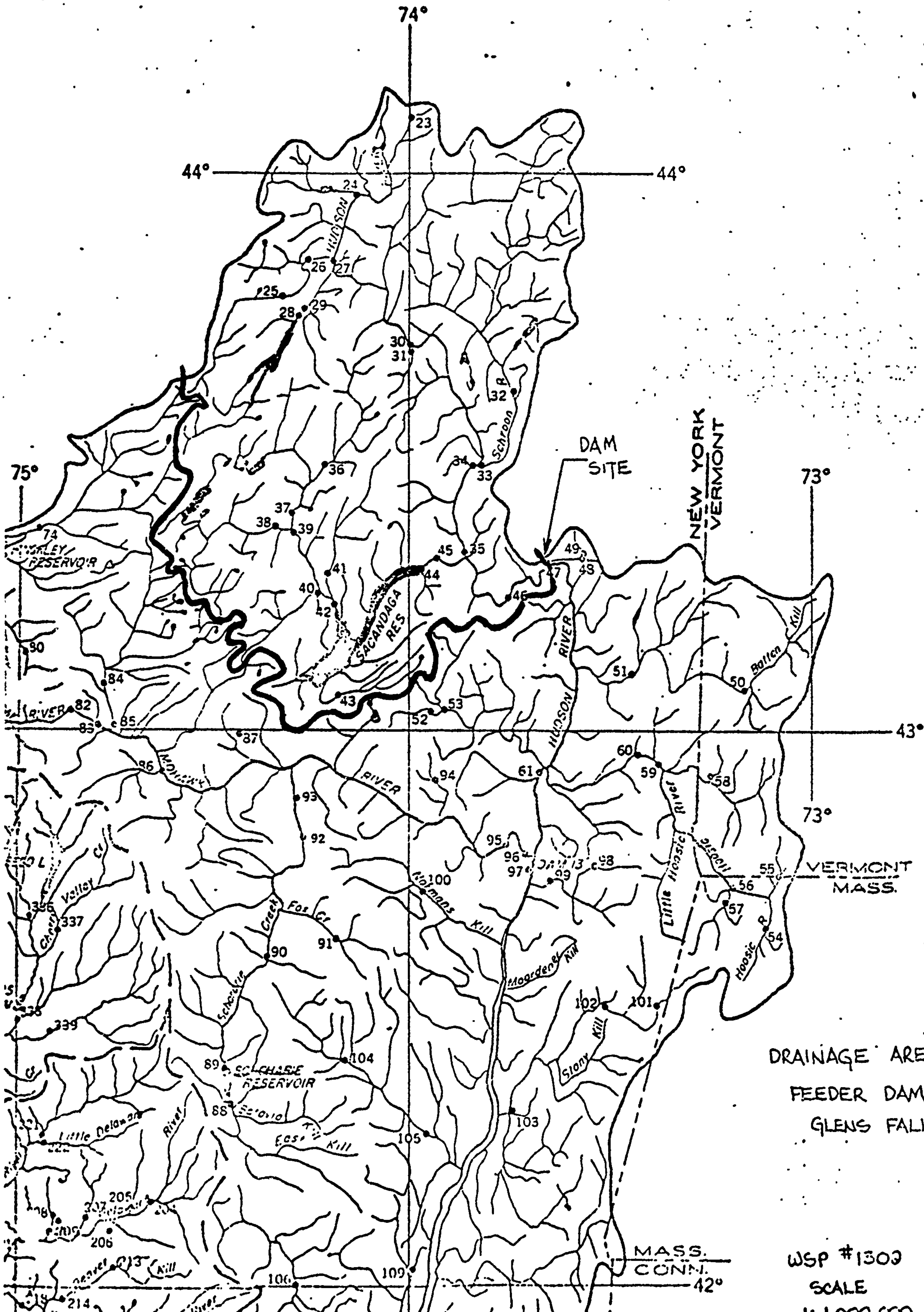
FLASHBOARDS -

$$V = \left(\frac{11 + 19.9}{2}\right)\frac{(35800)(600)}{43560}$$

$V = 7619$ ACRE-FT

NORTH BULKHEAD -

$$V = \left(\frac{16.1 + 25}{2}\right)\frac{(35800)(600)}{43560} = 10133 \text{ ACRE-FT}$$



DRAINAGE AREA – FEEDER DAM @ GLENS FALLS

WSP #1302
SCALE
1: 1,000,000

ver at Conklingville, N. Y.

June	July	Aug.	Sept.	The year
0.96	0.42	0.25	0.15	a39.04
[illegible].76	.41	.38	.23	32.40
3.85	.39	.51	.65	*27.50
[illegible].66	*.36	.25	*.72	*18.02
[illegible].03	.23	.21	.60	*29.95
[illegible].29	.25	.15	.19	30.14
.54	.43	.35	.51	23.71
.53	3.08	3.18	.97	22.63
[illegible].09	*1.03	*.27	*.35	*27.01
[illegible].43	*1.31	*.45	*.31	*27.20
[illegible]	[illegible]	*.23	*.82	*25.33
[illegible]	[illegible]	[illegible]	*.96	*28.85
[illegible]	[illegible]	[illegible]	*.40	*26.55
*.49	[illegible].77	*.48	*.26	*26.86
[illegible].71	2.06	.94	.50	33.47
.81	.40	.20	.43	23.93
.94	.47	.34	.77	30.23
1.33	2.44	1.72	1.05	30.12
[illegible].02	1.00	.65	1.27	32.19
[illegible].12	.75	1.08	1.40	27.74
[illegible].59	2.08	1.03	.71	36.80
[illegible] 58	1.22	.44	1.04	31.03
-	-	-	-	-

lished.

second

justed a/		Calendar year		
Per square mile	Runoff in inches	Observed Mean	Adjusted a/ Mean	Adjusted a/ Runoff in inches
*[illegible]	*39.04	-	2,360	30.48
2.39	32.40	-	2,480	31.99
*2.03	*27.50	-	2,240	28.80
*1.33	*18.06	-	*1,970	*25.28
*2.20	*29.95	-	*2,120	*27.28
2.22	30.14	-	2,200	28.26
1.74	23.71	-	1,600	20.52
1.67	22.63	-	1,960	25.12
*1.99	*27.01	-	*2,070	*26.69
*2.01	*27.20	-	*2,120	*27.25
*1.86	*25.33	-	*2,170	*27.85
*2.13	*28.65	-	*2,220	*28.57
*1.95	*26.55	-	*2,160	*27.80
*1.98	*26.86	-	*1,920	*24.63
2.47	33.47	-	2,360	30.24
1.76	23.93	-	2,080	26.68
2.22	30.23	-	2,340	30.16
2.22	30.12	-	2,730	35.09
2.37	32.19	-	2,330	29.92
2.04	27.74	-	2,470	31.75
2.71	36.80	-	2,210	28.48
2.29	31.03	-	2,550	32.69
1.98	26.98	1,530	1,810	23.26
1.46	19.83	1,440	1,850	23.73
1.88	25.59	2,290	2,280	29.48
[illegible]	27.23	1,814	1,620	21.00
[illegible]	[illegible]	1,433	1,410	18.34
[illegible]	[illegible]	2,298	2,246	29.19
[illegible]	[illegible]	2,189	2,292	29.86
[illegible]	32.10	2,292	2,302	29.92
1.84	24.93	1,912	1,948	25.31
1.82	24.76	1,824	1,618	21.04
1.76	23.94	1,831	2,130	27.78
[illegible]	17.92	1,471	1,347	17.52
1.65	25.20	2,046	2,002	26.02
2.44	33.04	2,451	2,386	31.02
1.78	24.23	1,765	1,766	23.03
2.46	33.39	3,038	3,165	41.15
[illegible]	30.89	1,675	1,818	23.65
[illegible].49	[illegible]	2,607	2,519	32.75
[illegible]	[illegible]	1,907	2,174	28.34
1.84	[illegible]	2,008	1,968	25.59
2.13	29.63	-	-	-

ce March 1930.
noff, in inches, since March 1930,
natural runoff because of uncertain-
these figures are not published herein.

46. Hudson River at Spier Falls, N. Y.1/

Location.--Lat 43°14'29", long 73°44'50", on right bank 0.5 mile downstream from Spier Falls dam, 11 miles southwest of Glens Falls, Warren County, and about 11½ miles downstream from Sacandaga River.

Drainage area.--2,779 sq mi, revised. At site used prior to June 1, 1904, 2,817 sq mi (revised), and June 1, 1904, to Sept. 30, 1912, 2,755 sq mi (revised).

Gage.--Water-stage recorder at present site and datum since October 1912. Datum of gage is [illegible] ft above mean low tide at New York City (levels by New York State Water Supply Commission). January 1899 to December 1908 staff gage at site about 14 miles downstream at different datum, and June 1904 to December 1912, staff gage about 7 miles upstream from described site at different datum.

Average discharge.--23 years (1899-1922), 5,391 cfs (unadjusted).

Extremes.--1912-22: Maximum discharge, 89,100 cfs Mar. 28, 1913 (gage height, 18.59 ft); minimum, about 5.5 cfs Sept. 23, 1917.

Remarks.--Seasonal flow affected by storage in Indian Lake and many small lakes and reservoirs in the upper part of the drainage basin. Diurnal fluctuation caused by mills and powerplants above station.

Cooperation.--Some gage heights, discharge measurements, and hourly discharges furnished by International Paper Co.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1899	-	-	-	3,527	1,902	5,005	16,811	9,561	1,617	1,150	-	1,347	-
1900	1,033	5,098	5,157	3,211	†7,074	3,934	16,914	6,358	2,834	1,248	1,652	1,110	4,595
1901	1,243	‡3,088	3,198	1,827	1,547	3,445	21,154	8,395	6,256	2,190	2,531	2,463	4,769
1902	2,679	2,138	4,771	2,422	2,218	13,316	7,060	4,692	5,293	7,204	4,743	2,466	4,949
1903	4,841	5,191	4,961	3,728	5,238	17,040	6,398	2,561	7,184	4,554	4,486	3,080	5,780
1904	6,691	3,733	3,546	4,889	3,403	7,009	16,030	10,250	5,520	2,460	3,030	2,890	5,787
1905	7,830	2,840	2,080	2,600	1,860	5,030	18,200	†7,000	9,900	6,580	3,570	9,350	6,400
1906	4,340	4,730	4,790	6,400	3,950	4,580	16,200	10,400	6,120	3,880	2,020	1,870	5,770
1907	2,210	3,150	2,380	6,240	2,110	6,510	13,100	11,100	3,670	2,650	1,720	2,800	4,820
1908	6,220	10,200	7,710	5,320	6,070	9,630	19,800	16,300	2,760	*1,840	*1,220	*933	*7,320
1909	*1,240	*1,560	*1,770	3,990	8,590	5,910	23,400	15,500	4,860	1,560	1,390	1,250	*5,870
1910	1,310	1,450	1,200	2,430	2,410	16,000	14,900	8,880	8,820	1,450	1,820	2,270	5,260
1911	2,420	2,740	1,540	2,640	2,040	2,790	14,700	8,770	*4,220	*1,770	*1,320	*1,830	*3,850
1912	*5,330	5,690	8,680	3,320	2,540	4,860	23,400	11,900	3,190	1,[illegible]10	1,420	1,810	*6,130
1913	‡3,380	6,260	4,900	8,580	2,980	21,[illegible]00	12,300	5,460	3,330	1,2[illegible]0	976	939	‡6,030
1914	2,080	5,150	2,990	1,590	1,710	2,750	24,400	9,660	1,650	1,800	1,510	1,770	4,750
1915	1,380	†2,010	2,370	4,180	5,060	5,170	9,410	3,850	1,570	[illegible],700	5,460	2,300	4,030
1916	2,890	3,030	3,200	5,330	6,430	4,940	18,000	12,300	4,990	2,550	1,430	1,520	5,540
1917	1,520	2,530	4,350	2,540	2,000	5,210	17,900	8,270	12,000	3,2[illegible]0	1,740	1,610	5,230
1918	3,350	4,870	2,040	1,580	2,320	7,680	19,100	8,710	3,880	1,830	1,450	2,310	4,920
1919	3,880	6,440	5,130	3,890	2,530	9,300	14,600	11,100	3,060	2,230	1,760	2,670	5,550
1920	3,920	6,090	4,060	2,210	1,830	6,710	20,900	7,480	2,410	2,220	2,040	1,610	5,110
1921	2,260	3,090	9,410	3,280	2,630	18,600	9,480	4,250	1,640	3,750	1,720	1,460	5,170
1922	1,730	4,280	4,410	2,260	2,640	[illegible],210	23,700	3,900	10,100	5,030	2,340	1,950	6,370
1923	1,890	1,930	1,450	3,160	2,090	3,600	-	-	-	-	-	-	-

* Only monthly figures revised; revised daily figures not published.
† Corrected.
‡ Not previously published; partly estimated on basis of records for nearby stations.

Yearly discharge, in cubic feet per second

Year	W.S.P. no.	Water year ending Sept. 30: Momentary maximum Discharge	Momentary maximum Date	Minimum day	Mean	Per square mile	Runoff in inches	Calendar year: Mean	Calendar year: Runoff in inches
1899	47	-	-	-	-	-	-	-	-
1900	47	-	-	20	4,595	1.63	22.13	4,281	20.62
1901	65	-	-	20	4,769	1.69	23.01	4,950	23.89
1902	82	-	-	30	4,949	1.76	23.87	5,367	26.02
1903	125	-	-	360	5,780	2.05	27.85	5,687	27.45
1904	125, 301	-	-	710	5,787	2.05	28.09	5,686	27.72
1905	301	-	-	1,[illegible]50	6,400	2.32	31.[illegible]	6,4[illegible]0	[illegible]
1906	301	-	-	1,440	[illegible],770	2.09	[illegible].44	5,[illegible]	[illegible].83
1907	301	-	-	1,360	4,820	1.75	23.73	6,190	30.50
1908	301	-	-	750	*7,320	*2.66	*36.20	*5,690	*28.14
1909	301	-	-	800	*5,870	*2.13	*28.94	*5,820	*28.69
1910	301	-	-	984	5,260	1.91	25.90	5,490	27.02
1911	301	-	-	1,000	*3,850	*1.40	*18.95	*4,940	*24.36
1912	321	-	-	1,110	*6,130	*2.23	*30.31	‡5,692	‡28.08
1913	351	89,100	Mar. 28, 1913	151	‡6,030	‡2.17	‡29.48	5,670	27.71
1914	381	52,200	Apr. 21, 1914	401	4,750	1.71	23.19	4,380	†21.38
1915	401	26,600	Apr. 13, 1915	467	4,030	1.45	†19.71	4,320	21.12

* Revised.
† Corrected.
‡ Not previously published.

1/ Published as "at Fort Edward," 1899-1908 (records to May 1904 used herein), as "at Corinth," June 1904 to December 1912 (records to September 1912 used herein), and "at Spier Falls" since October 1912.

Yearly discharge, in cubic feet per second, of Hudson River at Spier Falls, N. Y.--Continued

Year	W.S.P. no.	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches		Mean	Runoff in inches
		Discharge	Date							
1916	431	28,000	May 19, 1916	192	5,540	1.99	27.13		5,470	26.82
1917	451	30,100	June 12, 1917	506	5,230	1.88	25.57		5,380	26.31
1918	471	34,500	Apr. 4, 1918	606	4,920	1.77	24.07		5,360	26.20
1919	501	32,000	Apr. 13, 1919	722	5,550	2.00	27.19		5,450	26.62
1920	501	29,000	Apr.1,3, 1920	335	5,110	1.84	25.05		5,150	25.37
1921	521	32,800	Mar. 22, 1921	419	5,170	1.86	25.26		4,800	23.45
1922	541	58,000	Apr. 13, 1922	603	6,370	2.23	31.14		5,940	29.03
1923	561	-	-	-	-	-	-		-	-

Note. Monthly figures of discharge per square mile and runoff, in inches, previously published, may be subject to considerable error because of [illegible] in Indian Lake and other small lakes and reservoirs in the basin. These figures are not published herein.

47. Glens Falls feeder at Glens Falls, N. Y.

Location.--Lat 43°17'30", long 73°39'55", on right bank at upstream end of feeder canal in city of Glens Falls Warren County.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (Barge Canal datum). Auxiliary water-stage recorder 1,000 ft downstream from cement mill and 3.3 miles downstream from base gage.

Remarks.--Flow regulated in accordance with requirements of Champlain Canal and for floating logs. No diversion in winter months, during which periods the feeder may carry a small flow representing leakage through head gates.

Cooperation.--Records June 1919 to June 1921, and October 1924 to September 1925, not previously published by Geological Survey, furnished by State engineer and surveyor of New York.

Monthly mean discharge, in cubic feet per second

Year					May	June	July	Aug.	Sept.	Oct.	Nov.		
1919					-	223	203	228	271	261	-		
1920					-	248	242	237	247	275	-		
1921					-	205	-	-	-	-	-		
1924					-	-	-	-	-	230	-		
1925					-	188	193	-	191	-	-		
1927					-	204	208	221	206	161	148		
1928					163	161	176	203	229	210	194		
1929					134	187	229	233	233	193	-		
1930					146	152	178	184	203	188	-		
1931					145	178	195	203	163	150	-		
1932					-	132	180	166	162	140	155		
1933					137	139	125	140	167	164	198		
1934					143	131	151	164	182	196	181		
1935					159	129	122	152	155	150	130		
1936					171	160	139	152	170	173	190		
1937					168	166	157	175	191	183	184		
1938					160	150	159	156	171	187	-		
1939					-	137	130	139	156	161	-		
1940					-	159	168	188	202	207	-		
1941					157	152	156	162	168	191	-		
1942					133	169	183	190	180	187	189		
1943					188	164	139	138	161	167	177		
1944					135	118	134	139	159	162	160		
1945					124	130	134	135	152	147	458		
1946					-	107	105	99.3	77.9	73.6	80.4		
1947					-	-	131	170	180	186	184		
1948					147	143	170	155	174	179	175		
1949					162	145	142	154	163	175	173		
1950					140	133	141	131	140	140	131		

48. Glens Falls feeder at Dunham Basin, N. Y.

Location.--Lat 43°18'15", long 73°32'50", on left bank of Dunham Basin, Washington County, 100 ft upstream from Bond Brook, and 6 miles downstream from feeder dam at Glens Falls.

Gage.--Water-stage recorder. Datum of gage is 139.88 ft above mean sea level (Barge Canal datum).

Remarks.--Flow during navigation season is net diversion, through Glens Falls feeder, from the Hudson River basin to the summit level of the Champlain Division of the Barge Canal, and is regulated in accordance with requirements of the canal. Flow during remainder of year consists of leakage through head gates and runoff from area tributary to feeder above station. This flow may continue during period of no record.

Monthly mean discharge, in cubic feet

Year				Apr.	May
1945				-	-
1946				-	128
1947				-	94.1
1948				102	132
1949				-	144
1950				-	128

49. Bond Cr

Location.--Lat 43°18'25", long 73°32 a quarter of a mile upstream from half a mile upstream from Barge mouth at Fort Edward.

Drainage area.--14.7 sq mi.

Gage.--Water-stage recorder. Datum Canal datum).

Extremes.--1947-50. Maximum dischar minimum, 0 6 cfs Aug. [illegible]

Remarks.--During canal navigation se a mile below gage into Lake Champ Dunham Basin.

Monthly and yearly

Water year	Oct.	Nov.	Dec.	Jan.	Feb.
1947	-	-	-	-	-
1948	1.23	4.71	4.17	2.43	18 6
1949	2.49	27.5	54.6	37.7	29.3
1950	2.84	9.94	20.7	32.2	13.6

Monthly

Water year	Oct.	Nov.	Dec.	Jan.	Feb.
1947	-	-	-	-	-
1948	0.10	0.36	0.33	0.19	1.36
1949	.20	2.08	4.29	2 96	2.07
1950	.22	.75	1.62	2 53	.96

Yearly disc

Year	W.S.P. no.	Water	
		Momentary maximum	
		Discharge	Date
1947	1081	-	-
1948	1111	1,070	Mar. 20, 1948
1949	1141	1,370	Dec. 31, 1948
1950	1171	862	Mar. 25, 1950

50. Bat

Location.--Lat 43°04'40", long 73° Highway 313 at Arlington, Bennin

Drainage area.--152 sq mi.

Gage.--Water-stage recorder. Datum Prior to Nov. 18, 1941, chain gag

Average discharge.--22 years (1928-

Extremes.--[illegible] slope-area determination at gage minimum observed, 43 cfs Aug. [illegible]

Remarks.--Diurnal fluctuation at low

1/ Published as Bond Brook at Dunham B

-- at Spier Falls, N. Y.--Continued

		Calendar year	
Per square mile	Runoff in inches	Mean	Runoff in inches
1.99	27.13	5,470	26.82
1.85	25.57	5,380	25.31
1.77	24.07	5,360	26.20
2.00	27.19	5,450	26.62
1.84	25.05	5,180	25.37
1.86	25.26	4,800	23.45
2.29	31.14	5,940	29.03
-	-	-	-

herein.

Falls, N. Y.

at upstream end of feeder canal

sea level (Barge Canal datum).
from cement mill and 3.3 miles down-

of Champlain Canal and for float-
periods the feeder may carry a

1924 to September 1925, not pre-
State engineer and surveyor of New

-et per second

Sept.	Oct.	Nov.		
[illegible]	[illegible]	-		
247	[illegible]	-		
-	-	-		
-	230	-		
191	-	-		
206	161	148		
229	210	194		
233	193	-		
203	158	-		
163	150	-		
162	140	155		
167	164	198		
182	196	181		
155	150	130		
170	173	190		
191	183	184		
171	187	-		
156	161	-		
202	207	-		
168	191	-		
180	187	189		
161	167	177		
159	152	160		
152	147	458		
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	184		
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	173		
[illegible]	[illegible]	131		

Basin, N. Y.

at Dunham Basin, Washington County,
ream from feeder dam at Glens Falls.

above mean sea level (Barge

, through Glens Falls feeder,
the Champlain Division of the Barge
ents of the canal. Flow during
rates and runoff from area tribu-
during period of no record.

Monthly mean discharge, in cubic feet per second, of Glens Falls feeder at Dunham Basin, N. Y.

Year				Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.		
1945				-	-	-	-	-	-	139	149		
1946				-	128	92.3	79.2	75.2	56.3	59.7	69.2		
1947				-	94.1	107	96.6	125	149	166	173		
1948				102	132	116	120	109	113	143	162		
1949				-	144	109	101	111	117	137	155		
1950				-	128	102	95.0	94.0	99.3	119	126		

49. Bond Creek at Dunham Basin, N. Y.1/

Location.--[illegible] a quarter of a mile upstream from [illegible] feeder [illegible] Champlain [illegible], half a mile upstream from Barge Canal (Champlain Division), and 4 miles upstream from mouth at Fort Edward.

Drainage area.--14.7 sq mi.

Gage.--Water-stage recorder. Datum of gage is 140.30 ft above mean sea level (Barge Canal datum).

Extremes.--1947-50: Maximum discharge, 1,370 cfs Dec. 31, 1948 (gage height, 8.52 ft); minimum, 0.6 cfs Aug. 11, 13, 1949 (gage height, 1.73 ft).

Remarks.--During canal navigation season, a portion of the flow is diverted at point half a mile below gage into Lake Champlain basin through summit level of Champlain Canal at Dunham Basin.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1947	-	-	-	-	-	-	-	-	-	23.3	3.31	1.65	-
1948	1.23	4.71	4.17	2.43	18.6	91.1	27.4	16.2	16.0	9.78	5.42	1.46	16.6
1949	2.49	27.5	51.6	37.7	29.3	29.0	14.6	4.74	1.32	[illegible]	1.36	4.25	17.3
1950	2.84	9.94	20.7	32.2	13.6	[illegible]	[illegible]	5.63	3.25	1.39	1.97	4.29	16.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1947	-	-	-	-	-	-	-	-	-	1.83	0.26	0.12	-
1948	0.10	0.36	0.33	0.19	1.36	7.14	2.08	1.27	1.21	.77	.43	.11	15.35
1949	.20	2.08	4.28	2.96	2.07	2.28	1.11	.37	.10	.09	.12	.32	15.98
1950	.22	.75	1.62	2.53	.96	5.59	1.93	.45	.25	.16	.15	.33	14.94

Yearly discharge, in cubic feet per second

Year	W.S.P. no.	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches		Mean	Runoff in inches
		Discharge	Date							
1947	1081	-	-	-	-	-	-		-	-
1948	1111	1,070	Mar. 20, 1948	1.0	16.6	1.13	15.35		22.8	21.12
1949	1141	1,370	Dec. 31, 1948	.6	17.3	1.18	15.98		13.0	12.01
1950	1171	862	Mar. 28, 1950	1.0	16.2	1.10	14.94		-	-

50. Batten Kill at Arlington, Vt.

Location.--Lat 43°04'40", long [illegible], on left bank 5 ft upstream from bridge [illegible] [illegible]

Drainage area.--[illegible] sq mi.

Gage.--Water-stage recorder. Datum of gage is 597.68 ft above mean sea level, unadjusted. Prior to Nov. 18, 1941, chain gage at downstream side of bridge at same datum.

Average discharge.--22 years (1928-50), 338 cfs.

Extremes.--1928-50: Maximum discharge, 11,100 cfs Mar. 18, 1936 (gage height, 11.3 ft, present site, from floodmarks), from rating curve extended above 5,200 cfs on basis of slope-area determination at gage height 10.8 ft and computation of peak flow over dam; minimum observed, 43 cfs Aug. 11, 1933.

Remarks.--Diurnal fluctuation at low flow caused by mill above station.

1/ Published as Bond Brook at Dunham Basin prior to October 1950.

3270. Glens Falls feeder at Glens Falls, N. Y.

Location.--Lat 43°17'30", long 73°39'55", on right bank at upstream end of feeder canal in city of Glens Falls, Warren County.

Records available.--June 1919 to October 1920, June 1921, October 1924, June, July, September, 1925, June 1927 to September 1960 (navigation seasons only). Monthly discharge only for some periods, published in WSP 1302.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (Barge Canal datum).

Remarks.--Flow regulated in accordance with requirements of Champlain (Barge) Canal and for floating logs. No diversion in winter months, during which periods the feeder may carry a small flow representing leakage through headgates.

Correction.--In WSP 1302 the monthly mean discharge for November 1945 is listed in error; it should be 159 cfs.

Monthly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	140	131	-	-	-	-	-	130	135	145	152	139	-
1952	170	144	-	-	-	-	-	-	127	146	150	153	-
1953	160	155	-	-	-	-	-	111	135	139	137	148	-
1954	148	145	-	-	-	-	-	126	137	168	152	142	-
1955	152	-	-	-	-	-	-	-	131	144	137	140	-
1956	160	-	-	-	-	-	-	136	139	158	155	151	-
1957	140	179	-	-	-	-	-	133	147	135	140	131	-
1958	160	146	-	-	-	-	-	175	140	133	121	124	-
1959	122	139	-	-	-	-	-	126	133	143	117	136	-
1960	166	130	-	-	-	-	-	135	142	124	126	141	-

3275. Glens Falls feeder at Dunham Basin, N. Y.

Location.--Lat 43°18'15", long 73°32'50", on left bank at Dunham Basin, Washington County, 100 ft upstream from Bond Creek and 8 miles downstream from feeder dam at Glens Falls.

Records available.--September 1945 to September 1960 (navigation seasons only).

Gage.--Water-stage recorder. Datum of gage is 139.88 ft above mean sea level (Barge Canal datum).

Remarks.--Flow during navigation season is net diversion through Glens Falls feeder, from the Hudson River basin to the summit level of the Champlain (Barge) Canal, and is regulated in accordance with requirements of the canal. Flow during remainder of year consists of leakage through headgates and runoff from area tributary to feeder above station. This flow may continue during period of no record.

Monthly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	119	126	-	-	-	-	91.2	111	107	99.5	118	110	-
1952	153	144	-	-	-	-	-	131	124	128	131	126	-
1953	143	153	-	-	-	-	-	110	109	94.4	108	112	-
1954	122	129	-	-	-	-	113	122	115	113	103	108	-
1955	126	155	-	-	-	-	-	99.8	100	104	92.7	115	-
1956	166	178	-	-	-	-	-	134	127	127	125	130	-
1957	128	166	-	-	-	-	-	120	94.8	98.6	98.9	98.3	-
1958	136	133	-	-	-	-	-	158	125	100	84.3	87.6	-
1959	109	131	-	-	-	-	-	128	110	105	84.0	100	-
1960	134	126	-	-	-	-	-	134	109	71.7	76.5	107	-

3280. Bond Creek at D

Location.--Lat 43°18'25", long 73°32'55", on l County, a quarter of a mile upstream from G Canal, half a mile upstream from Champlain mouth at Fort Edward.

Drainage area.--14.7 sq mi.

Records available.--June 1947 to September 196 Bond Brook at Dunham Basin.

Gage.--Water-stage recorder. Datum of gage is Canal datum).

Average discharge.--13 years (1947-60), 18.2 c

Extremes.--1947-60: Maximum discharge, 1,370 minimum, 0.4 cfs July 18, 19, 1959.

Remarks.--During canal navigation season, a p half a mile below gage into Lake Champlain (Barge) Canal at Dunham Basin.

Monthly and yearly mean discha

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1951	1.83	9.06	23.6	15.4	62.9	57.0
1952	14.8	36.1	33.0	42.7	29.1	67.7
1953	3.22	5.51	32.9	27.9	41.2	59.0
1954	1.62	1.81	11.1	9.08	60.4	34.3
1955	1.99	21.5	19.7	3.94	35.4	70.3
1956	42.8	31.0	7.07	9.10	4.06	17.8
1957	3.34	5.43	10.9	22.6	15.3	22.9
1958	2.17	10.1	49.1	25.6	7.98	70.7
1959	5.58	8.49	7.65	15.4	8.34	17.1
1960	4.83	36.0	30.7	21.0	32.5	26.3

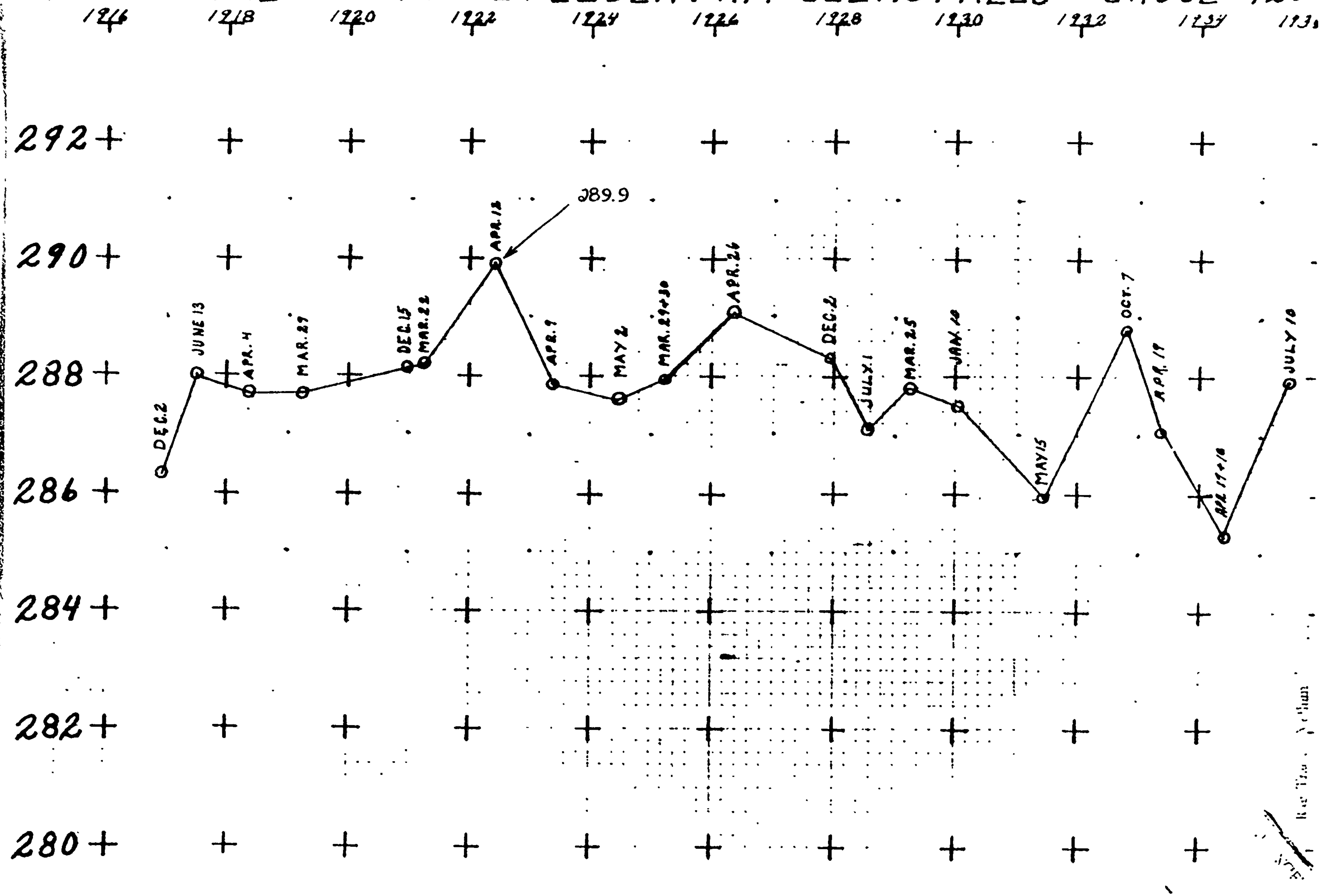
Monthly and yearl

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1951	0.14	0.69	1.85	1.21	4.46	4.67
1952	1.16	2.74	2.59	3.35	2.14	5.31
1953	.25	.42	2.58	2.19	2.92	4.63
1954	.13	.14	.87	.71	4.28	2.69
1955	.16	1.63	1.54	.31	2.51	5.51
1956	3.36	2.35	.55	.71	.30	1.40
1957	.26	.41	.86	1.77	1.08	1.78
1958	.17	.77	3.85	2.01	.57	5.55
1959	.44	.64	.60	1.21	.59	1.34
1960	.38	2.73	2.41	1.65	2.38	2.06

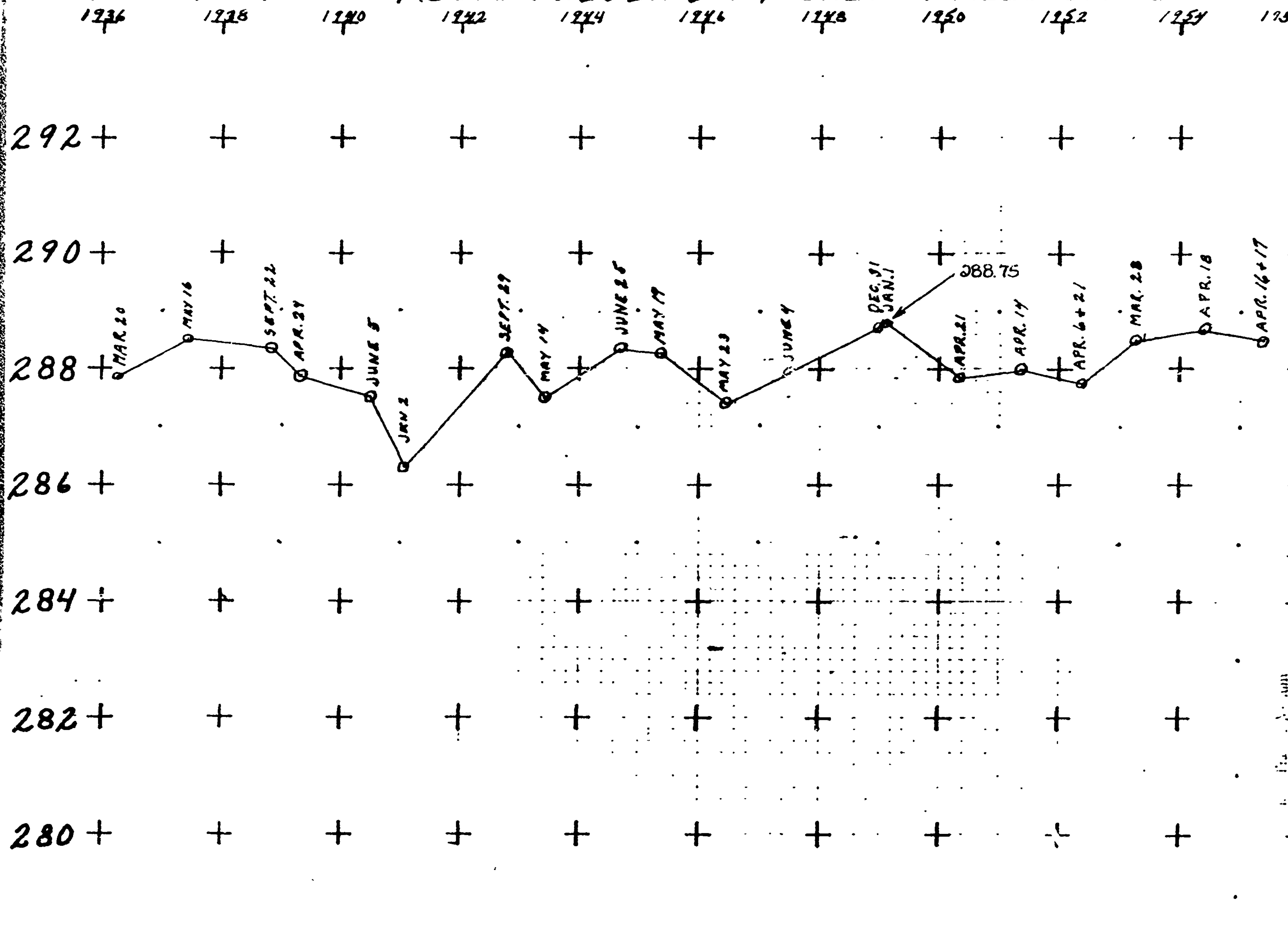
Yearly discharge,

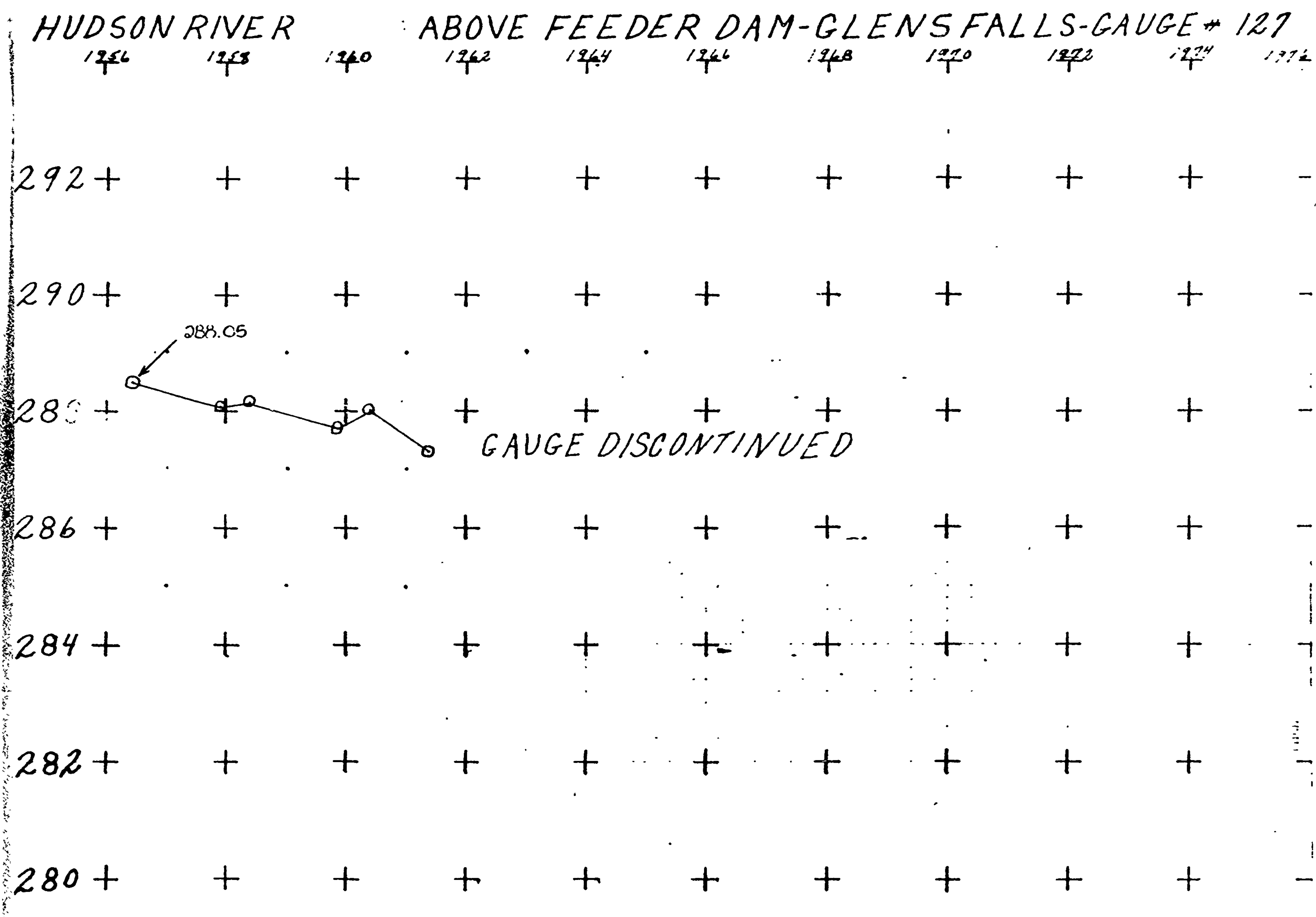
Year	WSP	Water year end: Momentary maximum: Discharge	Momentary maximum: Date
1950	-	-	-
1951	1202	450	Feb. 21, 1951
1952	1232	1,240	June 1, 1952
1953	1272	823	Feb. 21, 1953
1954	1332	745	June 1, 1954
1955	1382	626	Mar. 1, 1955
1956	1432	1,020	Apr. 5, 1956
1957	1502	622	Jan. 23, 1957
1958	1552	956	Dec. 21, 1957
1959	1622	734	Apr. 2, 1959
1960	1702	762	Nov. 28, 1959

HUDSON RIVER ABOVE FEEDER DAM - GLENS FALLS - GAUGE #127



HUDSON RIVER ABOVE FEEDER DAM - GLENS FALLS - GAUGE # 127




HUDSON RIVER ABOVE FEEDER DAM-GLENS FALLS-GAUGE # 127
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
292
290
288.05
288
GAUGE DISCONTINUED
286
284
282
280

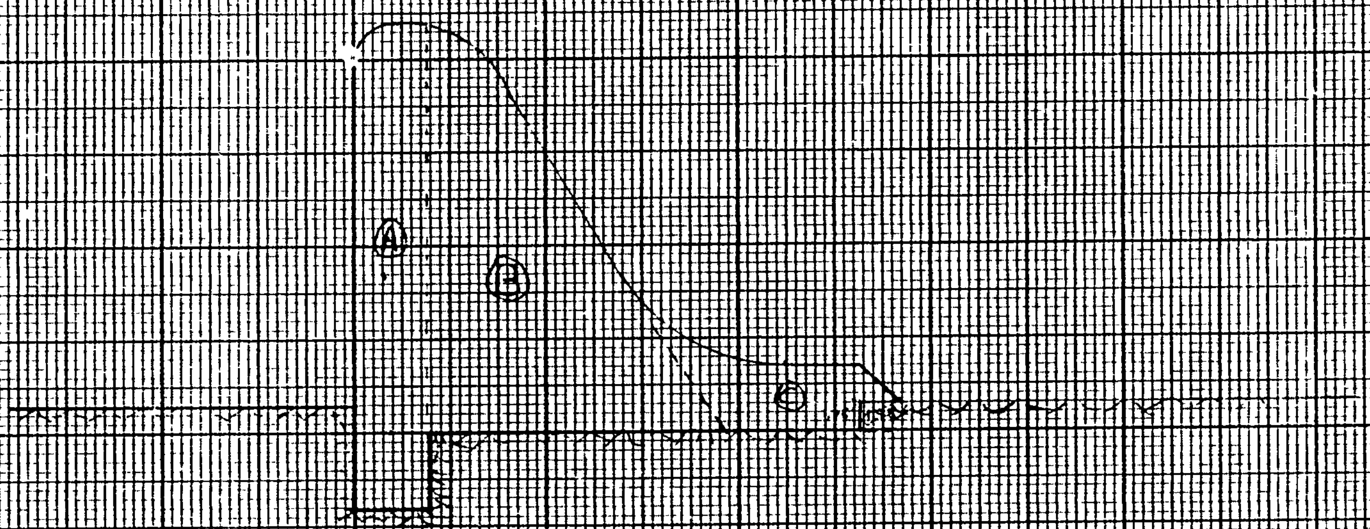
APPENDIX E

STRUCTURAL STABILITY ANALYSES

K+E 20 X 20 TO THE INCH 7 X 10 INCHES 46 1240 MADE IN U.S.A. KEUFFEL & ESSER CO

FEEDER DAM @ GLENS FALLS
#NY-143

HEIGHT = 26'
BASE = 28.33'



	AREA	DISTANCE BETWEEN TOE & CENTROID
A	(4)(26) = 104 ft²	26.33'
B	½(15.5)(22) = 170.5	19.16'
C	8.8(3) = 26.4	4.4'

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
FEEDER DAM AT GLENS FALLS	1		
SUBJECT: SEISMIC STABILITY ANALYSIS		COMPUTED BY: RLW	DATE: 6/ /79

SUMMATIONS OF MOMENTS AND FORCES TAKEN FROM CALCULATOR STABILITY PROGRAM

NORMAL CONDITIONS - WATER AT SPILLWAY CREST - NO ICE

1. CALCULATE HORIZONTAL FORCE ON UPSTREAM FACE DUE TO WATER PRESSURE

$P_e = C\lambda wh = .7(.1)(.0624)(26) = .113\ ^k/ft^2$

P_e = WATER PRESSURE

C = COEFFICIENT

w = Wgt. of water

h = height

$V_e = .726\ P_e y = .726(.113)(26) = 2.14K$

2. CALCULATE MOMENT

$M_e = .299\ P_e y^2 = .299(.113)(26)^2 = 22.84\ k\text{-}ft$

3. REDUCE WEIGHT OF CONCRETE BY 5%

$(.115)(.95) = .109$

4. REVISED OVERTURNING SAFETY FACTOR

$$F.S. = \frac{\text{RESISTING MOMENTS}}{\text{OVERTURNING MOMENTS + EARTHQUAKE Mom.}} = \frac{27465.2}{1312+228} = 20.58$$

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
Feeder Dam At Glens Falls	2		
SUBJECT		COMPUTED BY	DATE
Seismic Stability Analysis		[illegible]	[illegible]

5 REVISED SLIDING SAFETY FACTOR

$$F.S. = \frac{\text{RESISTING FORCE}}{\text{SLIDING FORCE} + \text{EARTHQUAKE FORCE}} = \frac{135775.73}{3553.35 + 2.14} = 37.97$$

NORMAL CONDITIONS W/ KEY

0.15	RCL 1
104.	
104.	RCL 2
26.3	
26.3	RCL 3
170.5	
170.5	RCL 4
19.2	
19.2	RCL 5
26.4	
26.4	RCL 6
4.4	
4.4	RCL 7
28.3	
28.3	RCL 8
26.	
26.	RCL 9
0.	
0.	RCL 10
0.6	
0.6	RCL 11
130.	
130.	RCL 12
0.17	
0.17	RCL 13
5.8	
5.8	RCL 14
0.	
0.	RCL 15
5.5	
5.5	RCL 16
6.	
0.	RCL 17
10.	
10.	RCL 18
0.0624	
0.0624	RCL 46
26.	

NORMAL CONDITIONS PLUS ICE W/KEY

0.15	RCL 1
104.	
104.	RCL 2
26.3	
26.3	RCL 3
170.5	
170.5	RCL 4
19.2	
19.2	RCL 5
26.4	
26.4	RCL 6
4.4	
4.4	RCL 7
28.3	
28.3	RCL 8
26.	
26.	RCL 9
10.	
10.	RCL 10
0.6	
0.6	RCL 11
130.	
130.	RCL 12
0.17	
0.17	RCL 13
5.8	
5.8	RCL 14
0.	
0.	RCL 15
5.5	
5.5	RCL 16
6.	
6.	RCL 17
10.	
18.	RCL 18
0.0624	
0.0624	RCL 18
0.0624	
0.0624	RCL 46
26.	

FACTORS OF SAFETY

Normal conditions w/ key		Normal conditions plus ice w/key
21.39690591	OVERTURNING	17.8580199
~~[illegible]~~		~~[illegible]~~
38.22425[illegible]2	SLIDING	[illegible]80252

NORMAL CONDITIONS
W/ KEY
(SEISMIC ANALYSIS)

```
0.109        RCL
               1

104.
104.         RCL
               2

25.3
25.3         RCL
               3

170.5
170.5        RCL
               4

0.
0.           RCL
               5

26.4
26.4         RCL
               6

4.4
4.4          RCL
               7

28.3
28.3         RCL
               8

26.
26.          RCL
               9

0.
0.           RCL
              10

0.6
0.6          RCL
              11

130.
130.         RCL
              12

0.17
0.17         RCL
              13

5.8
5.8          RCL
              14

0.
0.           RCL
              15

5.5
5.5          RCL
              16

6.
6.           RCL
              17

10.
10.          RCL
              18

0.0624
0.0624       RCL
              46

36.
```

FACTORS OF SAFETY

OVERTURNING ——— 20.93050928
25854.81482
SLIDING ——— 38.20042077

1/2 PMF w/KEY

```
0.15        RCL
             1
104.
104.        RCL
             2
26.3
26.3        RCL
             3
170.5
170.5       RCL
             4
19.2
19.2        RCL
             5
26.4
26.4        RCL
             6
4.4
4.4         RCL
             7
28.3
28.3        RCL
             8
26.
26.         RCL
             9
0.
0.          RCL
             10
0.6
0.6         RCL
             11
130.
130.        RCL
             12
0.17
0.17        RCL
             13
5.8
5.8         RCL
             14
15.
15.         RCL
             15
5.5
5.5         RCL
             16
6.
6.          RCL
             17
10.
10.         RCL
             18
0.0624
0.0624      RCL
             46
26.
```

1/2 PMF wo/KEY

```
0.15        RCL
             1
88.
88.         RCL
             2
26.3
26.3        RCL
             3
170.5
170.5       RCL
             4
19.2
19.2        RCL
             5
26.4
26.4        RCL
             6
4.4
4.4         RCL
             7
28.3
28.3        RCL
             8
22.
22.         RCL
             9
0.
0.          RCL
             10
0.6
0.6         RCL
             11
130.
130.        RCL
             12
0.17
0.17        RCL
             13
5.8
5.8         RCL
             14
15.
15.         RCL
             15
1.5
1.5         RCL
             16
1.7
1.7         RCL
             17
6.
6.          RCL
             18
0.0624
0.0624      RCL
             19
0.
0.          RCL
             46
22.
```

FACTORS OF SAFETY

	w/KEY	wo/KEY
OVERTURNING	14.94632064	1.452005353
	~~[illegible]~~	~~[illegible]~~
SLIDING	35.75335971	16.05810279

APPENDIX F

REFERENCES

REFERENCES

1) US Army Corps of Engineers; New York District; Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models, October 1976.

2) US Geological Survey; Compilation of Records of Surface Waters of the United States, Part 1-B North Atlantic Slope Basins;

   Water Supply Paper 1302 (Through September 1950), 1960.

   Water Supply Paper 1722 (October 1950 to September 1960), 1964.

3) H.W. King and E.F. Brater; Handbook of Hydraulics, 5th edition, McGraw - Hill, 1963.

4) E.E. Seelye; Design, 3rd edition, John Wiley and Sons, Inc., 1960.

5) University of the State of New York; Geology of New York, Education Leaflet 20, Reprinted 1973.

6) U.S. Department of the Interior, Bureau of Reclamation; Design of Small Dams, 2nd edition (rev. reprint), 1977.

APPENDIX G

CORPS OF ENGINEERS GUIDELINES

Reclamation and Soil Conservation Service. Many other agencies, educational facilities and private consultants can also provide expert advice. Regardless of where such expertise is based, the qualification of those individuals offering to provide it should be carefully examined and evaluated.

4.3.4. Freeboard Allowances. Guidelines on specific minimum freeboard allowances are not considered appropriate because of the many factors involved in such determinations. The investigator will have to assess the critical parameters for each project and develop its minimum requirement. Many projects are reasonably safe without freeboard allowance because they are designed for overtopping, or other factors minimize possible overtopping. Conversely, freeboard allowances of several feet may be necessary to provide a safe condition. Parameters that should be considered include the duration of high water levels in the reservoir during the design flood; the effective wind fetch and reservoir depth available to support wave generation; the probability of high wind speed occurring from a critical direction; the potential wave runup on the dam based on roughness and slope; and the ability of the dam to resist erosion from overtopping waves.

4.4. Stability Investigations. The Phase II stability investigations should be compatible with the guidelines of this paragraph.

4.4.1. Foundation and Material Investigations. The scope of the foundation and materials investigation should be limited to obtaining the information required to analyze the structural stability and to investigate any suspected condition which would adversely affect the safety of the dam. Such investigations may include borings to obtain concrete, embankment, soil foundation, and bedrock samples; testing specimens from these samples to determine the strength and elastic parameters of the materials, including the soft seams, joints, fault gouge and expansive clays or other critical materials in the foundation; determining the character of the bedrock including joints, bedding planes, fractures, faults, voids and caverns, and other geological irregularities; and installing instruments for determining movements, strains, suspected excessive internal seepage pressures, seepage gradients and uplift forces. Special investigations may be necessary where suspect rock types such as limestone, gypsum, salt, basalt, claystone, shales or others are involved in foundations or abutments in order to determine the extent of cavities, piping or other deficiencies in the rock foundation. A concrete core drilling program should be undertaken only when the existence of significant structural cracks is suspected or the general qualitative condition of the concrete is in doubt. The tests of materials will be necessary only where such data are lacking or are outdated.

4.4.2. Stability Assessment. Stability assessments should utilize in situ properties of the structure and its foundation and pertinent geologic

information. Geologic information that should be considered includes groundwater and seepage conditions; lithology, stratigraphy, and geologic details disclosed by borings, "as-built" records, and geologic interpretation; maximum past overburden at site as deduced from geologic evidence; bedding, folding and faulting; joints and joint systems; weathering; slickensides, and field evidence relating to slides, faults, movements and earthquake activity. Foundations may present problems where they contain adversely oriented joints, slickensides or fissured material, faults, seams of soft materials, or weak layers. Such defects and excess pore water pressures may contribute to instability. Special tests may be necessary to determine physical properties of particular materials. The results of stability analyses afford a means of evaluating the structure's existing resistance to failure and also the effects of any proposed modifications. Results of stability analyses should be reviewed for compatibility with performance experience when possible.

4.4.2.1. Seismic Stability. The inertial forces for use in the conventional equivalent static force method of analysis should be obtained by multiplying the weight by the seismic coefficient and should be applied as a horizontal force at the center of gravity of the section or element. The seismic coefficients suggested for use with such analyses are listed in Figures 1 through 4. Seismic stability investigations for all high hazard category dams located in Seismic Zone 4 and high hazard dams of the hydraulic fill type in Zone 3 should include suitable dynamic procedures and analyses. Dynamic analyses for other dams and higher seismic coefficients are appropriate if in the judgment of the investigating engineer they are warranted because of proximity to active faults or other reasons. Seismic stability investigations should utilize "state-of-the-art" procedures involving seismological and geological studies to establish earthquake parameters for use in dynamic stability analyses and, where appropriate, the dynamic testing of materials. Stability analyses may be based upon either time-history or response spectra techniques. The results of dynamic analyses should be assessed on the basis of whether or not the dam would have sufficient residual integrity to retain the reservoir during and after the greatest or most adverse earthquake which might occur near the project location.

4.4.2.2. Clay Shale Foundation. Clay shale is a highly overconsolidated sedimentary rock comprised predominantly of clay minerals, with little or no cementation. Foundations of clay shales require special measures in stability investigations. Clay shales, particularly those containing montmorillonite, may be highly susceptible to expansion and consequent loss of strength upon unloading. The shear strength and the resistance to deformation of clay shales may be quite low and high pore water pressures may develop under increase in load. The presence of slickensides in clay shales is usually an indication of low shear stength. Prediction

of field behavior of clay shales should not be based solely on results of conventional laboratory tests since they may be misleading. The use of peak shear strengths for clay shales in stability analyses may be unconservative because of nonuniform stress distribution and possible progressive failures. Thus the available shear resistance may be less than if the peak shear strength were mobilized simultaneously along the entire failure surface. In such cases, either greater safety factors or residual shear strength should be used.

4.4.3. Embankment Dams.

4.4.3.1. Liquefaction. The phenomenon of liquefaction of loose, saturated sands and silts may occur when such materials are subjected to shear deformation or earthquake shocks. The possibility of liquefaction must presently be evaluated on the basis of empirical knowledge supplemented by special laboratory tests and engineering judgment. The possibility of liquefaction in sands diminishes as the relative density increases above approximately 70 percent. Hydraulic fill dams in Seismic Zones 3 and 4 should receive particular attention since such dams are susceptible to liquefaction under earthquake shocks.

4.4.3.2. Shear Failure. Shear failure is one in which a portion of an embankment or of an embankment and foundation moves by sliding or rotating relative to the remainder of the mass. It is conventionally represented as occurring along a surface and is so assumed in stability analyses, although shearing may occur in a zone of substantial thickness. The circular arc or the sliding wedge method of analyzing stability, as pertinent, should be used. The circular arc method is generally applicable to essentially homogeneous embankments and to soil foundations consisting of thick deposits of fine-grained soil containing no layers significantly weaker than other strata in the foundation. The wedge method is generally applicable to rockfill dams and to earth dams on foundations containing weak layers. Other methods of analysis such as those employing complex shear surfaces may be appropriate depending on the soil and rock in the dam and foundation. Such methods should be in reputable usage in the engineering profession.

4.4.3.3. Loading Conditions. The loading conditions for which the embankment structures should be investigated are (I) Sudden drawdown from spillway crest elevation or top of gates, (II) Partial pool, (III) Steady state seepage from spillway crest elevation or top of gate elevation, and (IV) Earthquake. Cases I and II apply to upstream slopes only; Case III applies to downstream slopes; and Case IV applies to both upstream and downstream slopes. A summary of suggested strengths and safety factors are shown in Table 4.

4.4.3.6. Seepage Analyses. Review and modifications to original seepage design analyses should consider conditions observed in the field inspection and piezometer instrumentation. A seepage analysis should consider the permeability ratios resulting from natural deposition and from compaction placement of materials with appropriate variation between horizontal and vertical permeability. An underseepage analysis of the embankment should provide a critical gradient factor of safety for the maximum head condition of not less than 1.5 in the area downstream of the embankment.

$$F.S = i_c/i = \frac{H_c/D_b}{H/D_b} = D_b \frac{(\gamma_m - \gamma_w)}{H \gamma_w} \qquad (2)$$

i_c = Critical gradient

i = Design gradient

H = Uplift head at downstream toe of dam measured above tailwater

H_c = The critical uplift

D_b = The thickness of the top impervious blanket at the downstream toe of the dam

γ_m = The estimated saturated unit weight of the material in the top impervious blanket

γ_w = The unit weight of water

Where a factor of safety less than 1.5 is obtained the provision of a underseepage control system is indicated. The factor of safety of 1. is a recommended minimum and may be adjusted by the responsible engineer based on the competence of the engineering data.

4.4.4. Concrete Dams and Appurtenant Structures.

4.4.4.1. Requirements for Stability. Concrete dams and structures appurtenant to embankment dams should be capable of resisting overturning, sliding and overstressing with adequate factors of safety for normal and maximum loading conditions.

4.4.4.2. Loads. Loadings to be considered in stability analyses include the water load on the upstream face of the dam; the weight of the structure; internal hydrostatic pressures (uplift) within the body of the dam, at the base of the dam and within the foundation; earth and silt loads; ice pressure, seismic and thermal loads, and other loads as applicable. Where tailwater or backwater exists on the downstream side of the structure it should be considered, and assumed uplift pressures should be compatible with drainage provisions and uplift measurements if available. Where applicable, ice pressure should be applied to the contact surface of the structure at normal pool elevation. A unit pressure of not more than 5,000 pounds per square foot should be used. Normally, ice thickness should not be assumed greater than two feet. Earthquake forces should consist of the inertial forces due to the horizontal acceleration of the dam itself and hydrodynamic forces resulting from the reaction of the reservoir water against the structure. Dynamic water pressures for use in conventional methods of analysis may be computed by means of the "Westergaard Formula" using the parabolic approximation (H.M. Westergaard, "Water Pressures on Dams During Earthquakes," Trans., ASCE, Vol 98, 1933, pages 418-433), or similar method.

4.4.4.3. Stresses. The analysis of concrete stresses should be based on in situ properties of the concrete and foundation. Computed maximum compressive stresses for normal operating conditions in the order of 1/3 or less of in situ strengths should be satisfactory. Tensile stresses in unreinforced concrete should be acceptable only in locations where cracks will not adversely affect the overall performance and stability of the structure. Foundation stresses should be such as to provide adequate safety against failure of the foundation material under all loading conditions.

4.4.4.4. Overturning. A gravity structure should be capable of resisting all overturning forces. It can be considered safe against overturning if the resultant of all combinations of horizontal and vertical forces, excluding earthquake forces, acting above any horizontal plane through the structure or at its base is located within the middle third of the section. When earthquake is included the resultant should fall within the limits of the plane or base, and foundation pressures must be acceptable. When these requirements for location of the resultant are not satisfied the investigating engineer should assess the importance to stability of the deviations.

4.4.4.5. Sliding. Sliding of concrete gravity structures and of abutment and foundation rock masses for all types of concrete dams should be evaluated by the shear-friction resistance concept. The available sliding resistance is compared with the driving force which tends to induce sliding to arrive at a sliding stability safety factor. The investigation should be made along all potential sliding paths. The critical path is that plane or combination of planes which offers the least resistance.

4.4.4.3.1. Sliding Resistance. Sliding resistance is a function of the unit shearing strength at no normal load (cohesion) and the angle of friction on a potential failure surface. It is determined by computing the maximum horizontal driving force which could be resisted along the sliding path under investigation. The following general formula is obtained from the principles of statics and may be derived by resolving forces parallel and perpendicular to the sliding plane:

$$R_R = V \tan(\phi + \alpha) + \frac{cA}{\cos\alpha(1 - \tan\phi \tan\alpha)} \qquad (3)$$

where

R_R = Sliding Resistance (maximum horizontal driving force which can be resisted by the critical path)

ϕ = Angle of internal friction of foundation material or, where applicable, angle of sliding friction

V = Summation of vertical forces (including uplift)

c = Unit shearing strength at zero normal loading along potential failure plane

A = Area of potential failure plane developing unit shear strength "c"

α = Angle between inclined plane and horizontal (positive for uphill sliding)

For sliding downhill the angle α is negative and Equation (1) becomes:

$$R_R = V \tan(\phi - \alpha) + \frac{cA}{\cos\alpha(1 + \tan\phi \tan\alpha)} \qquad (4)$$

When the plane of investigation is horizontal, and the angle α is zero and Equation (1) reduced to the following:

$$R_R = V \tan\phi + cA \qquad (5)$$

4.4.4.5.2. Downstream Resistance. When the base of a concrete structure is embedded in rock or the potential failure plane lies below the base, the passive resistance of the downstream layer of rock may sometimes be utilized for sliding resistance. Rock that may be subjected to high velocity water scouring should not be used. The magnitude of the downstream resistance is the lesser of (a) the shearing resistance along the continuation of the potential sliding plane until it daylights or (b) the resistance available from the downstream rock wedge along an inclined plane. The theoretical resistance offered by the passive wedge can be computed by a formula equivalent to formula (3):

$$P_p = W \tan(\phi + \alpha) + \frac{cA}{\cos\alpha\,(1 - \tan\phi \tan\alpha)} \qquad (6)$$

P_p = passive resistance of rock wedge

W = weight (buoyant weight if applicable) of downstream rock wedge above inclined plane of resistance, plus any superimposed loads

ϕ = angle of internal friction or, if applicable, angle of sliding friction

α = angle between inclined failure plane and horizontal

c = unit shearing strength at zero normal load along failure plane

A = area of inclined plane of resistance

When considering cross-bed shear through a relatively shallow, competent rock strut, without adverse jointing or faulting, W and α may be taken at zero and 45°, respectively, and an estimate of passive wedge resistance per unit width obtained by the following equation:

$$P_p = 2\,cD \qquad (7)$$

where

D = Thickness of the rock strut

4.4.4.5.3. Safety Factor. The shear-friction safety factor is obtained by dividing the resistance R_R by H, the summation of horizontal service

loads to be applied to the structure:

$$S_{s-f} = \frac{R_R}{H} \tag{8}$$

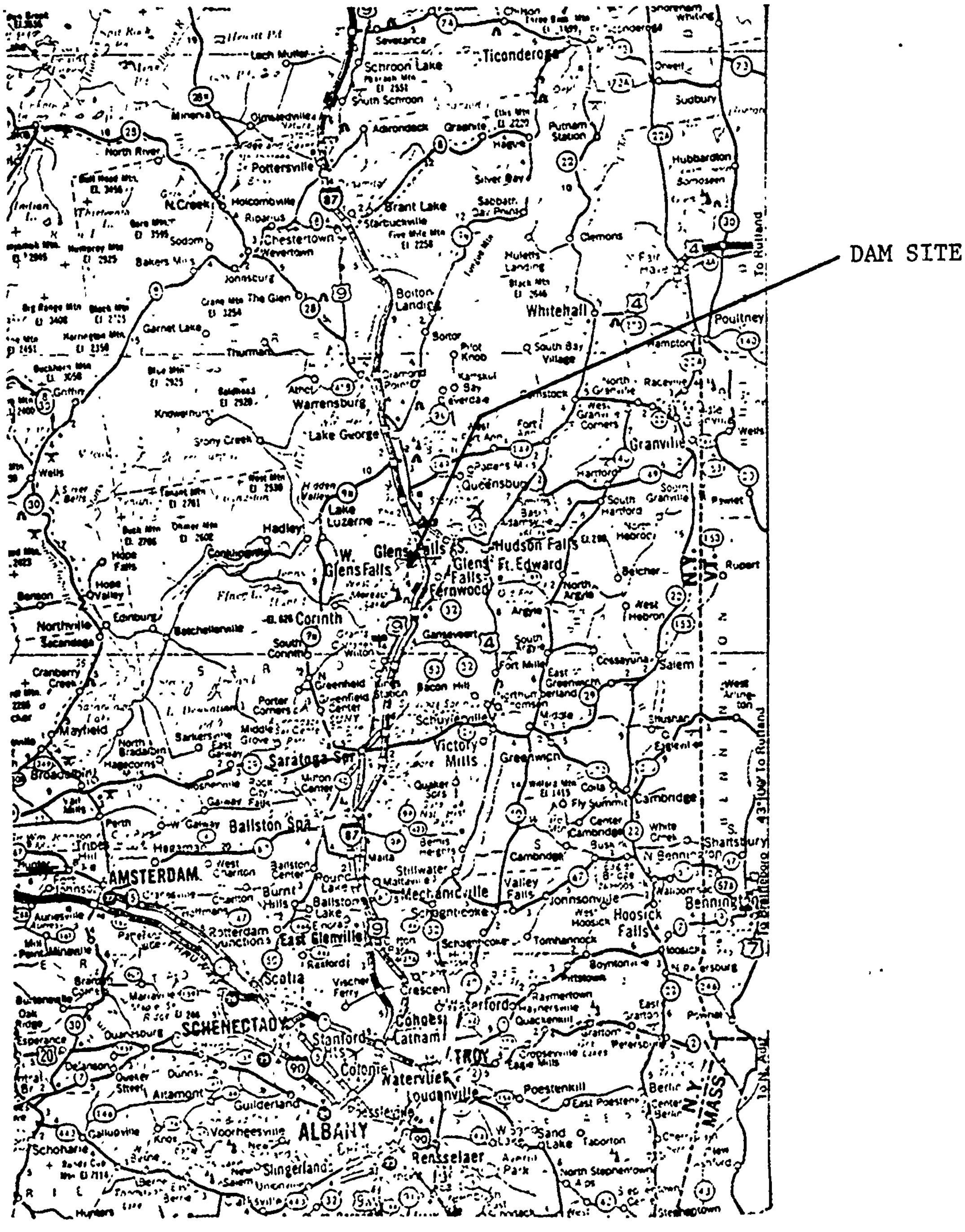
When the downstream passive wedge contributes to the sliding resistance, the shear fruction safety factor formula becomes:

$$S_{s-f} = \frac{R_R + P_p}{H} \tag{9}$$

The above direct superimposition of passive wedge resistance is valid only if shearing rigidities of the foundation components are similar. Also, the compressive strength and buckling resistance of the downstream rock layer must be sufficient to develop the wedge resistance. For example, a foundation with closely spaced, near horizontal, relatively weak seams might not contain sufficient buckling strength to develop the magnitude of wedge resistance computed from the cross-bed shear strength. In this case wedge resistance should not be assumed without resorting to special treatment (such as installing foundation anchors). Computed sliding safety factors approximating 3 or more for all loading conditions without earthquake, and 1.5 including earthquake, should indicate satisfactory stability, depending upon the reliability of the strength parameters used in the analyses. In some cases when the results of comprehensive foundation studies are available, smaller safety factors may be acceptable. The selection of shear strength parameters should be fully substantiated. The bases for any assumptions; the results of applicable testing, studies and investigations; and all pre-existing, pertinent data should be reported and evaluated.

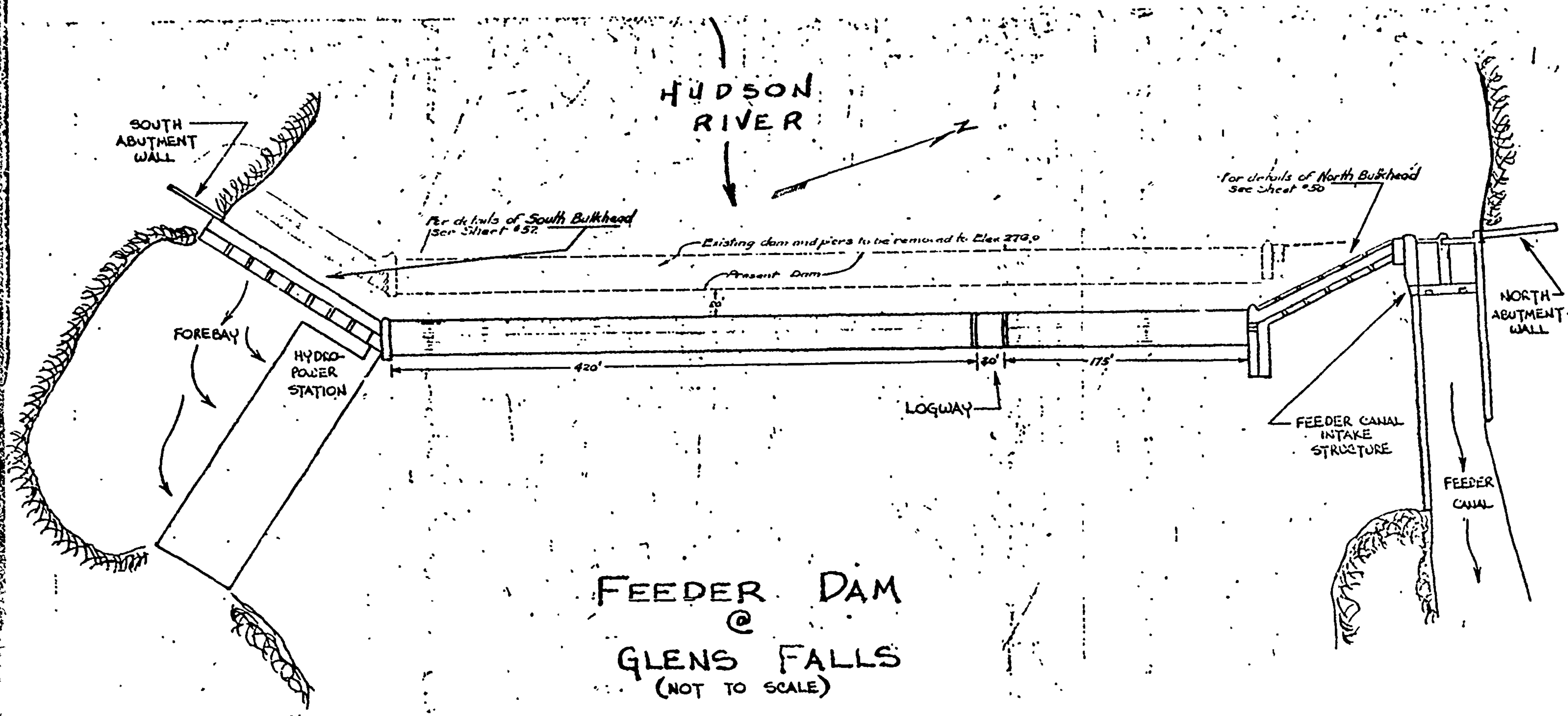
APPENDIX H

DRAWINGS

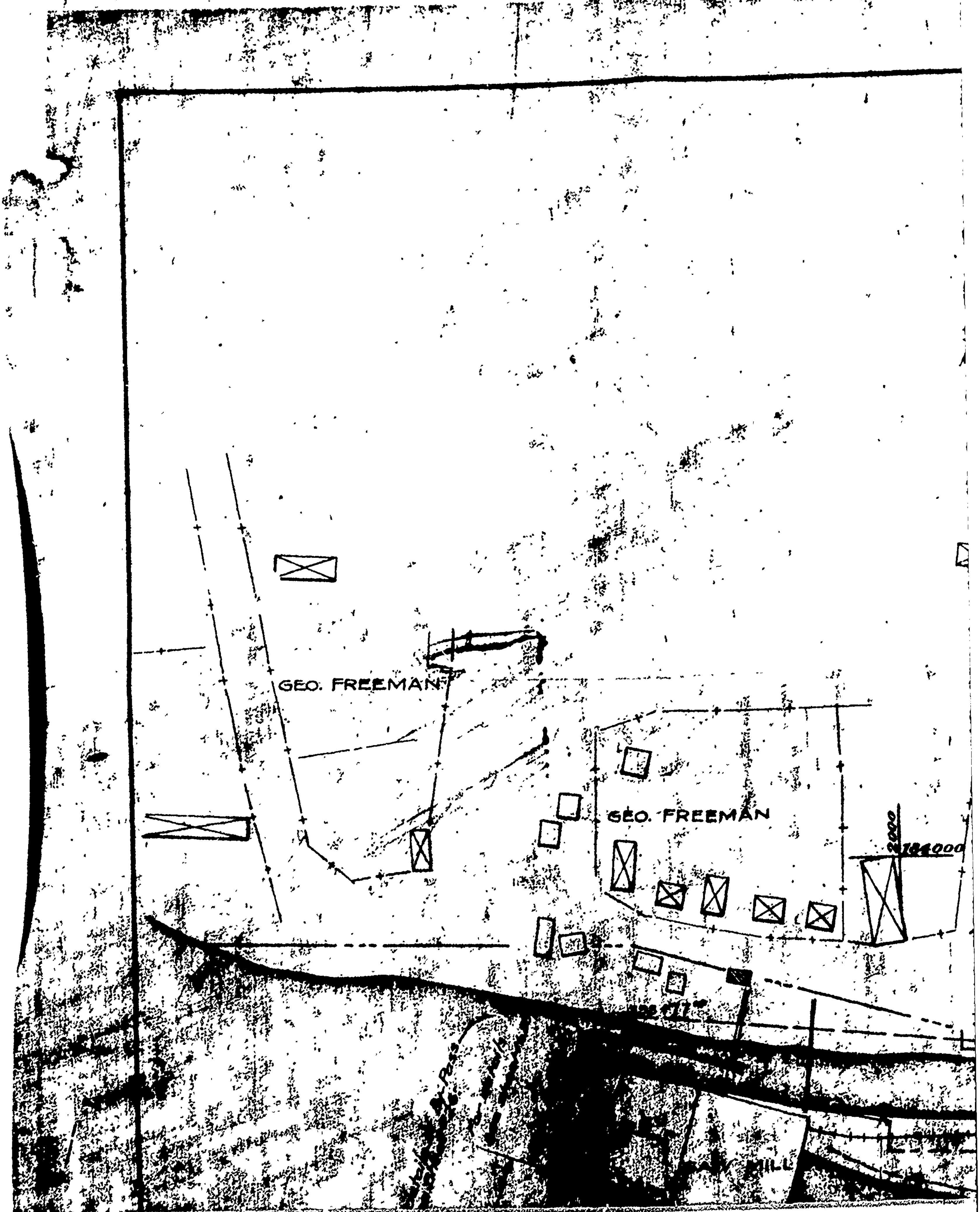


VICINITY MAP

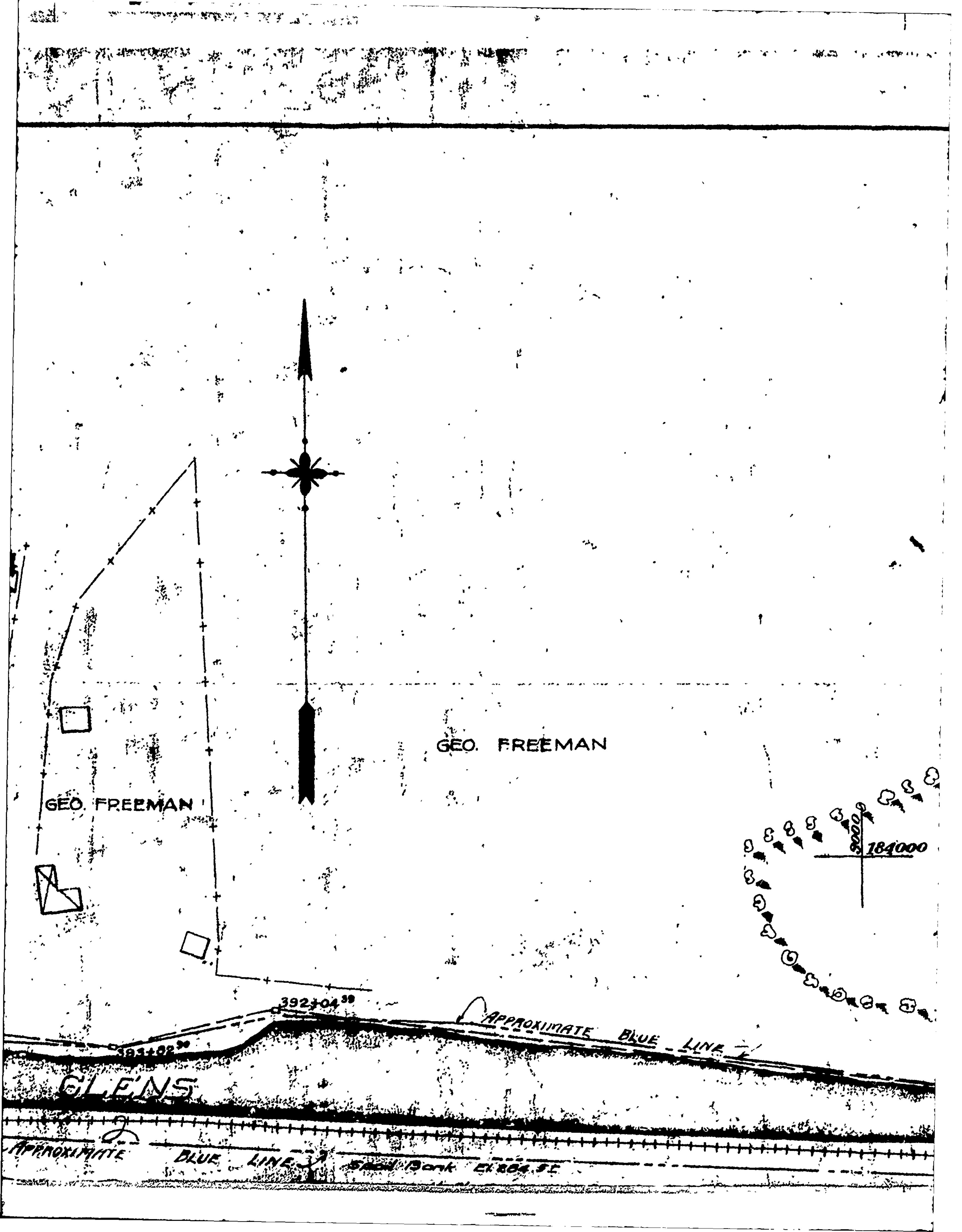
FEEDER DAM @ GLENS FALLS



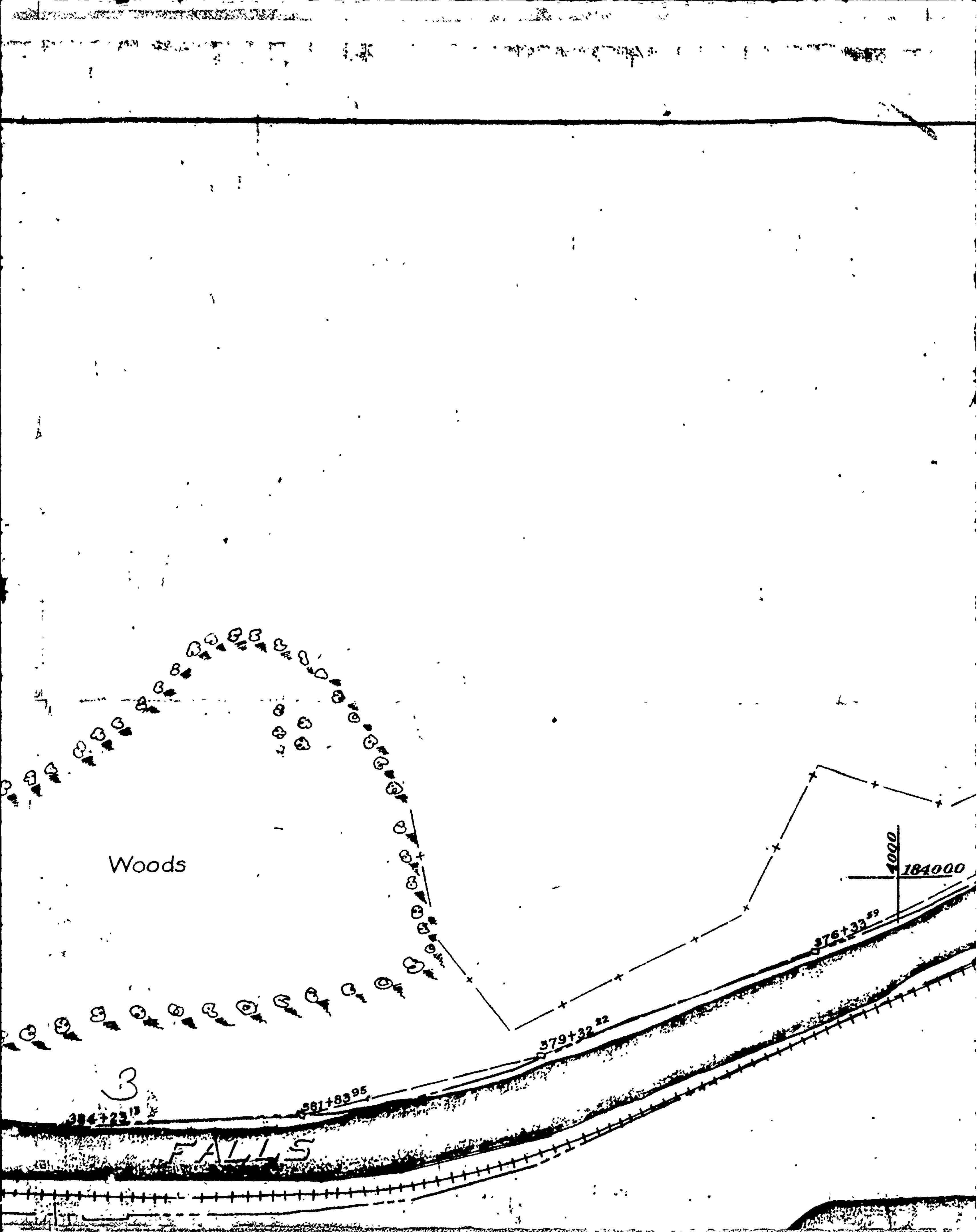
PERTINENT FEATURES OF THE FEEDER DAM @ GLENS FALLS

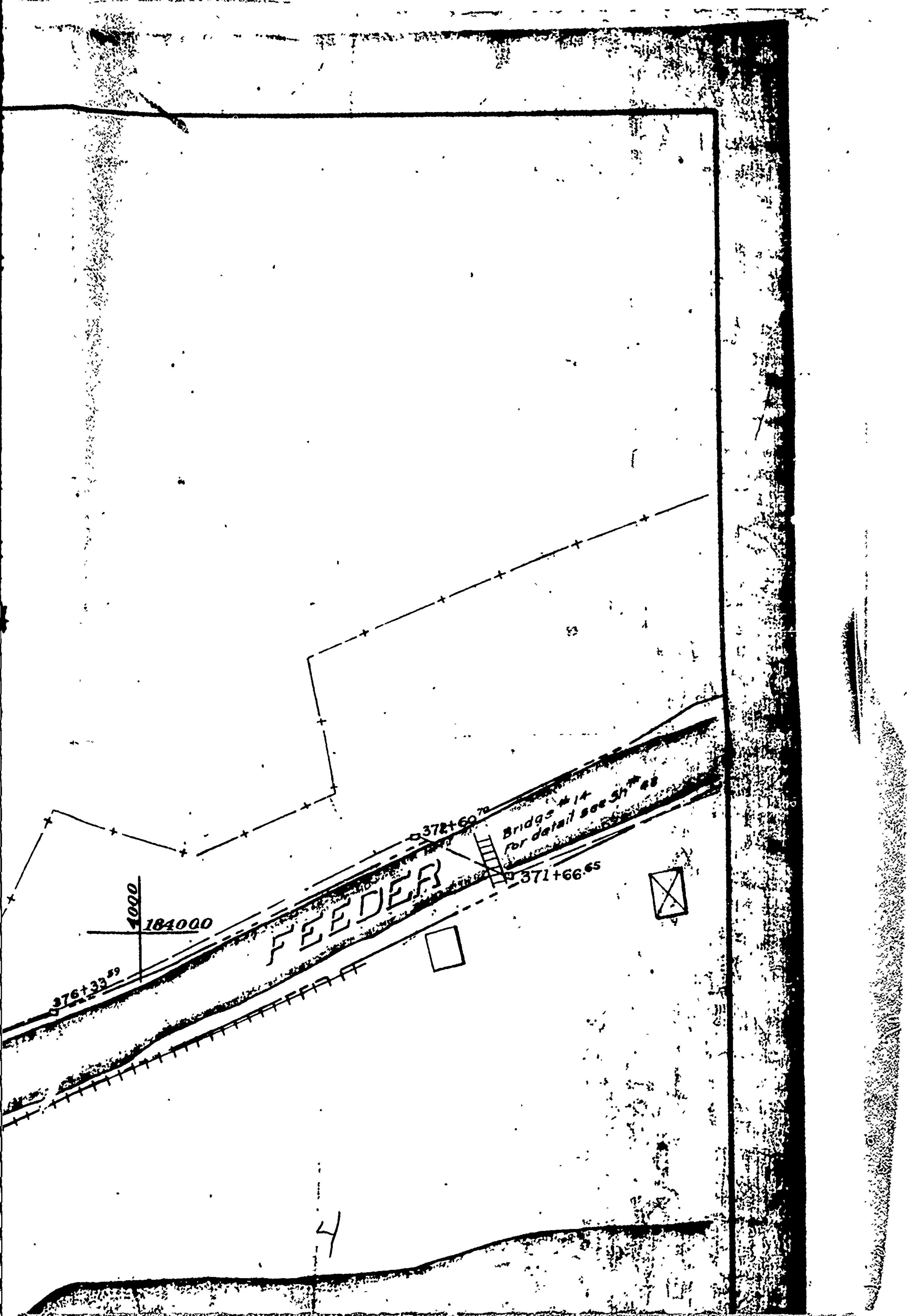


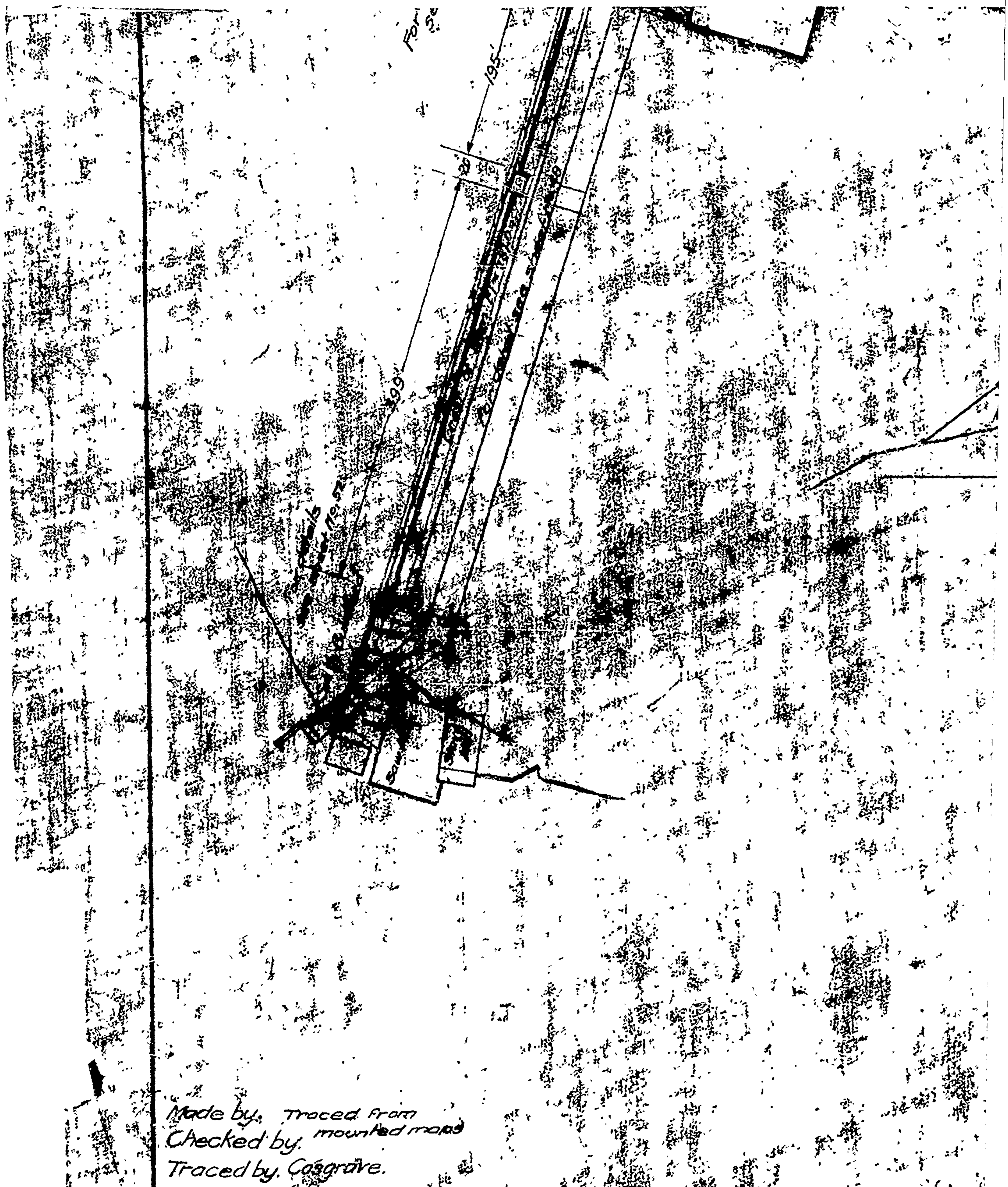
GEO. FREEMAN
GEO. FREEMAN
2000
184000
MILL

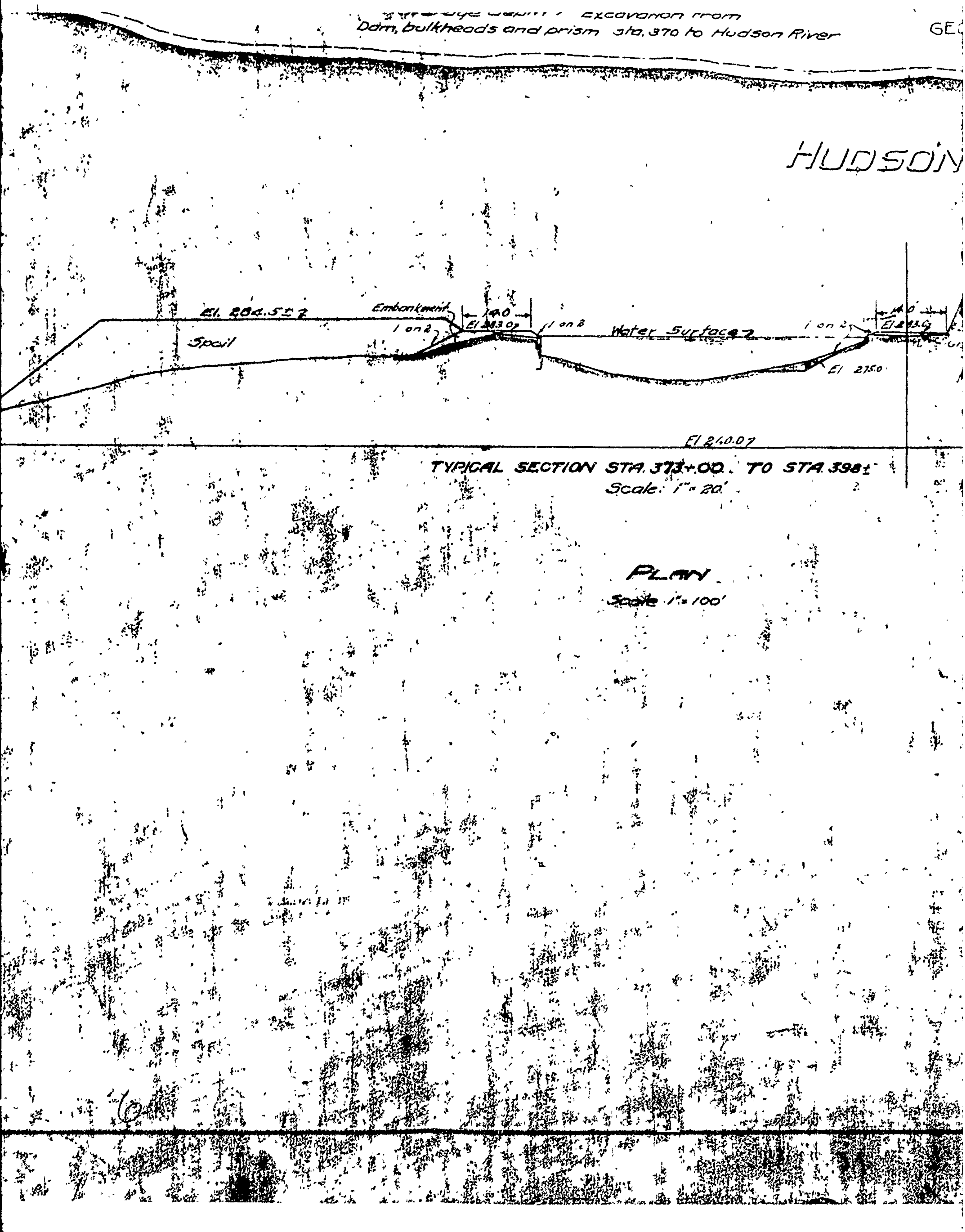


GEO. FREEMAN
GEO. FREEMAN
184000
392+04 39
393+82 30
APPROXIMATE BLUE LINE
GLENS
APPROXIMATE BLUE LINE

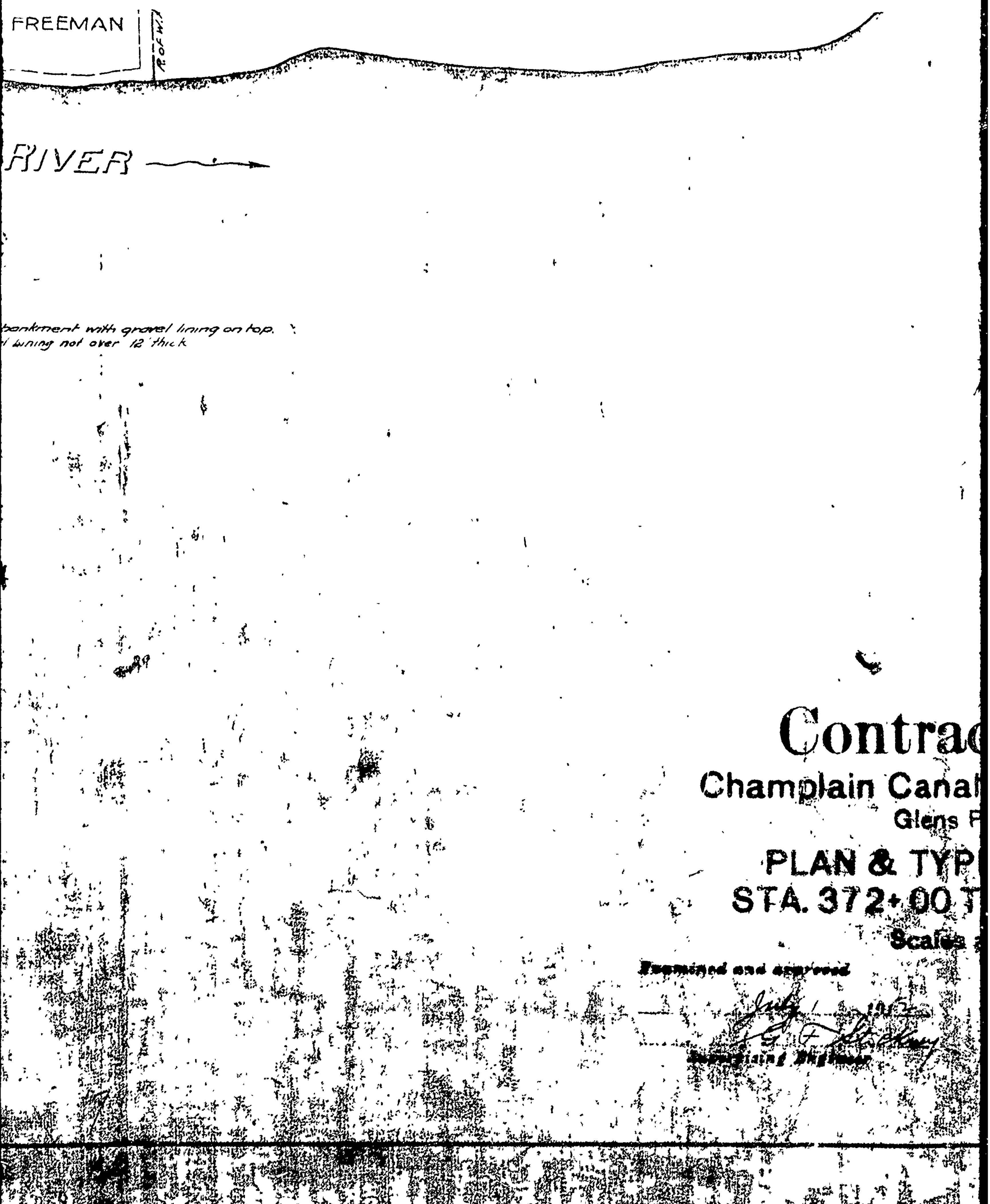

Woods
1000
184000
376+33 59
379+32 22
381+83 95
384+23
3
FALLS


FEEDER
Bridge #14
for detail see Sh't #8
371+66.65
1000
184000
376+33.59
4


195'
399
Made by. Traced from mounted maps
Checked by.
Traced by. Cosgrave.
2nd. Check by.
5



Excavation from
Dam, bulkheads and prism sta. 370 to Hudson River
GE
HUDSON
El. 284.5±
Spoil
Embankment
1 on 2
14.0
El 283.0
1 on 8
Water Surface
1 on 2
14.0
El 283.0
El 275.0
El 240.0
TYPICAL SECTION STA. 373+00. TO STA. 398±
Scale: 1"=20'
PLAN
Scale 1"=100'
6


FREEMAN
RIVER
bankment with gravel lining on top.
l lining not over 12" thick
Contrac
Champlain Canal
Glens F
PLAN & TYP
STA. 372+00 T
Scales
Examined and approved
Supervising Engineer

Contract No. 56.

plain Canal Section 2

Glens Falls Feeder

LAN & TYPICAL SECTIONS
. 372+00 TO HUDSON RIVER

Scales as indicated

proved

1 ... 1912

F. Stickney

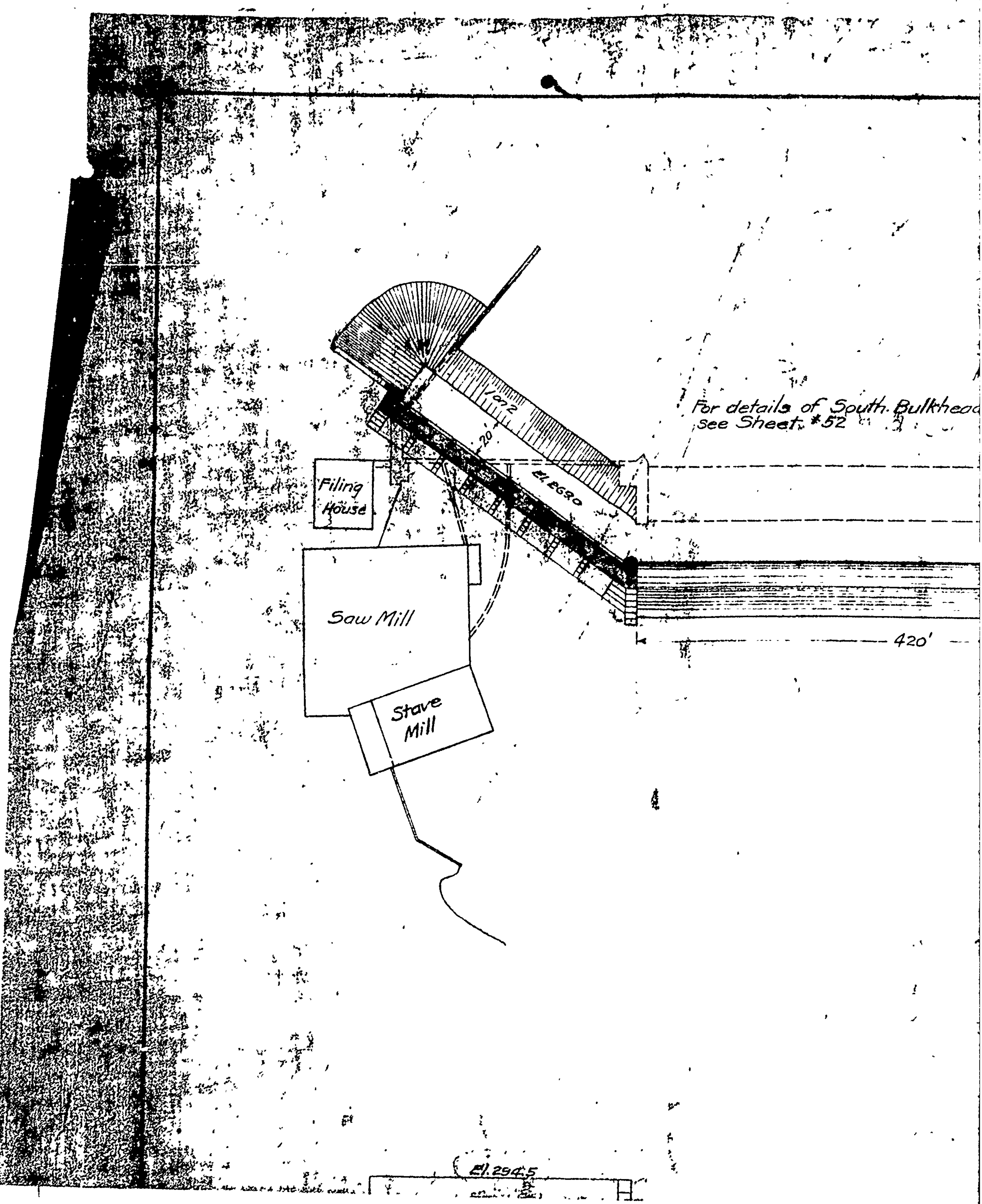
Engineer

Examined and approved

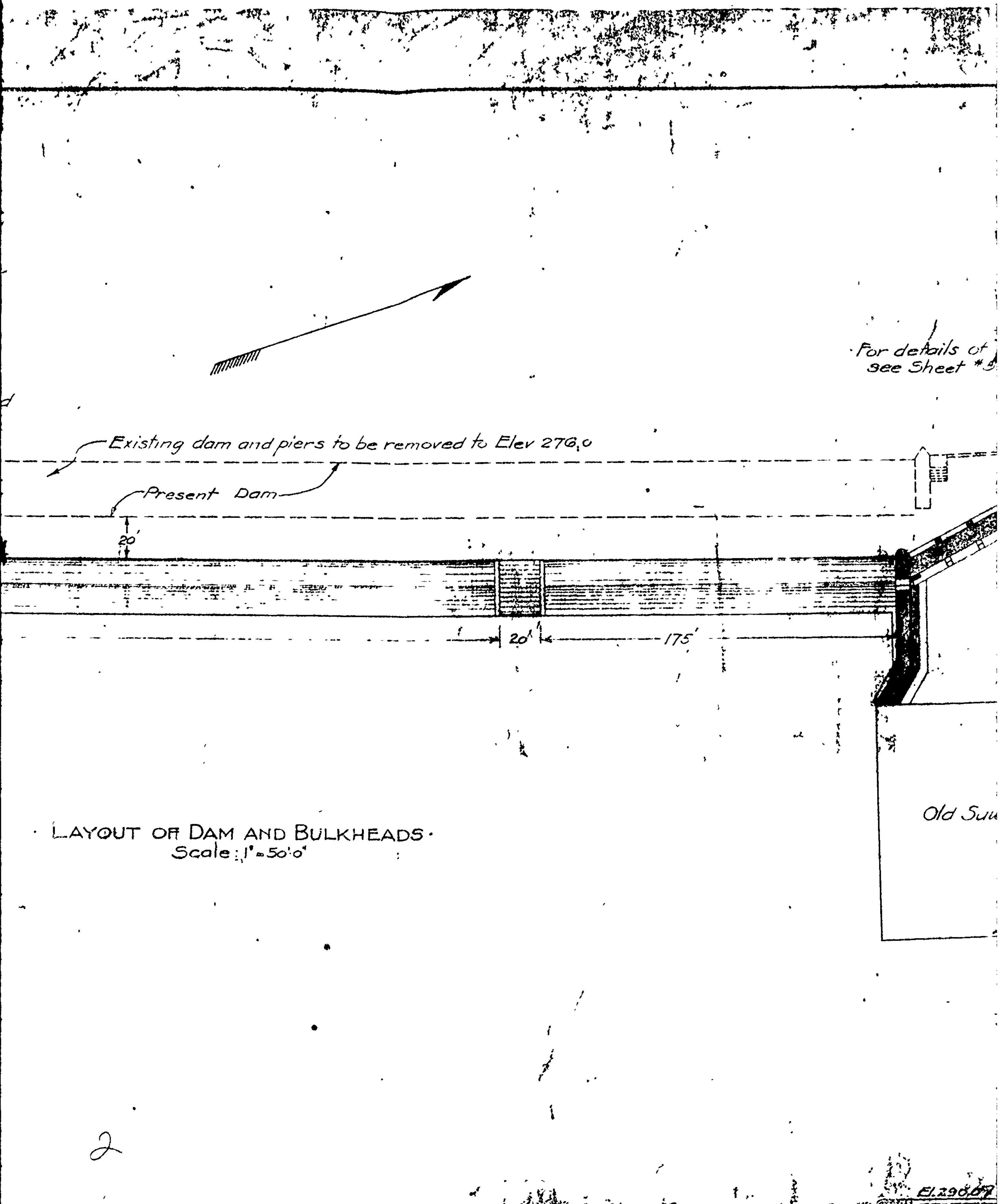
July 1, 1912

Alvin E. Zeist

Special Deputy State Engineer

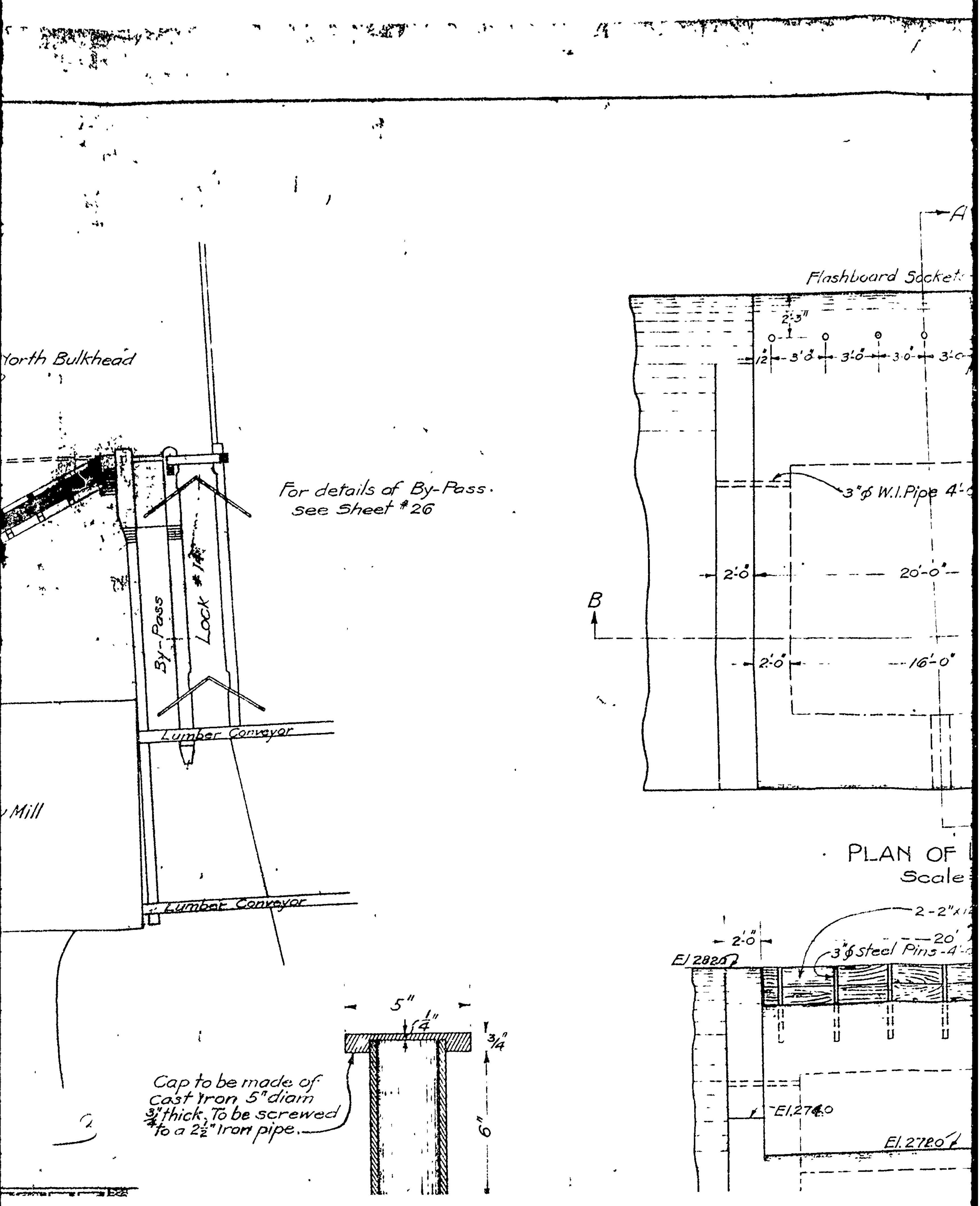


For details of South Bulkhead
see Sheet #52
1072
20'
El. 2690
Filing House
Saw Mill
Stave Mill
420'
El. 294.5

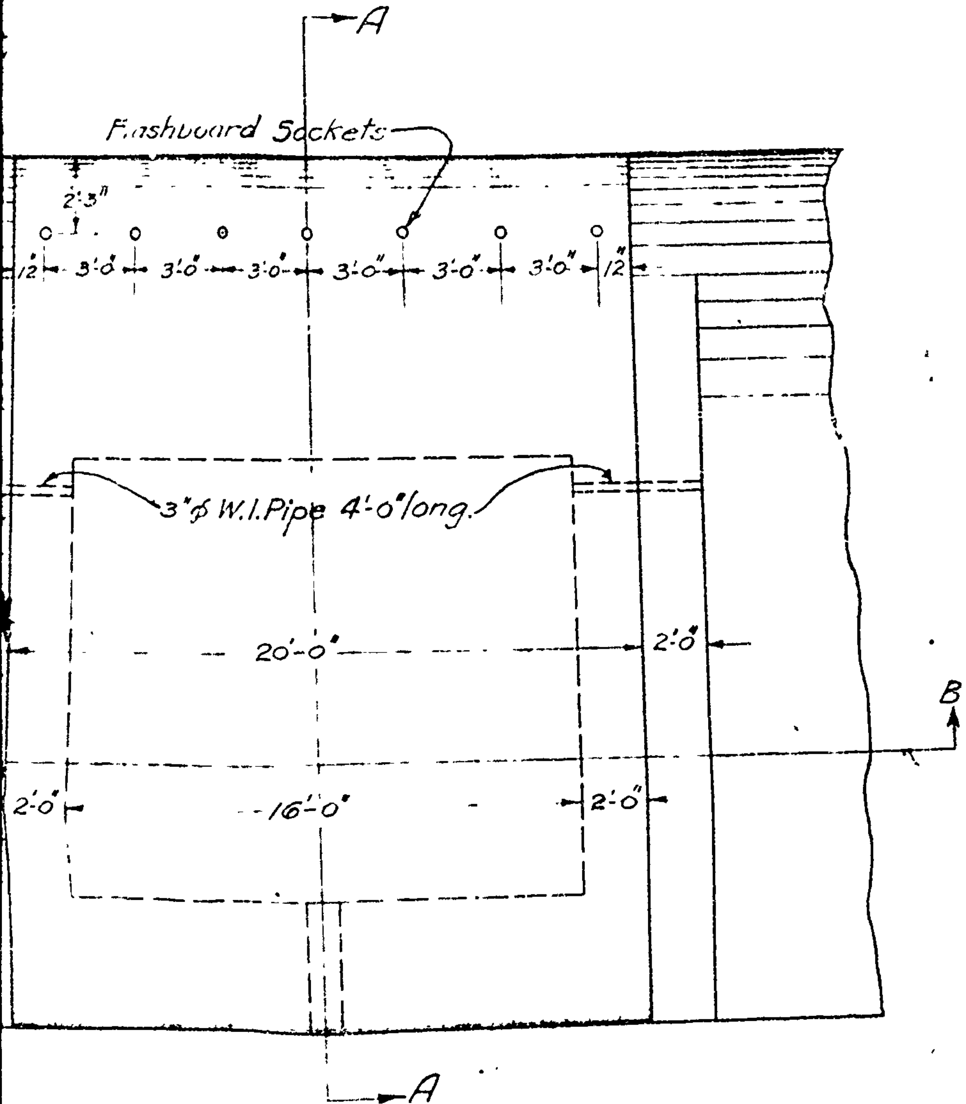


LAYOUT OF DAM AND BULKHEADS
Scale: 1" = 50'0"

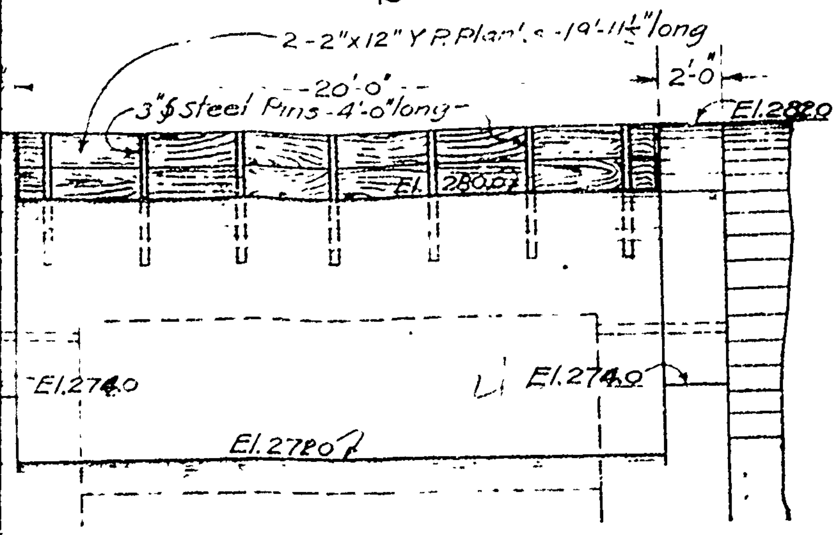
2

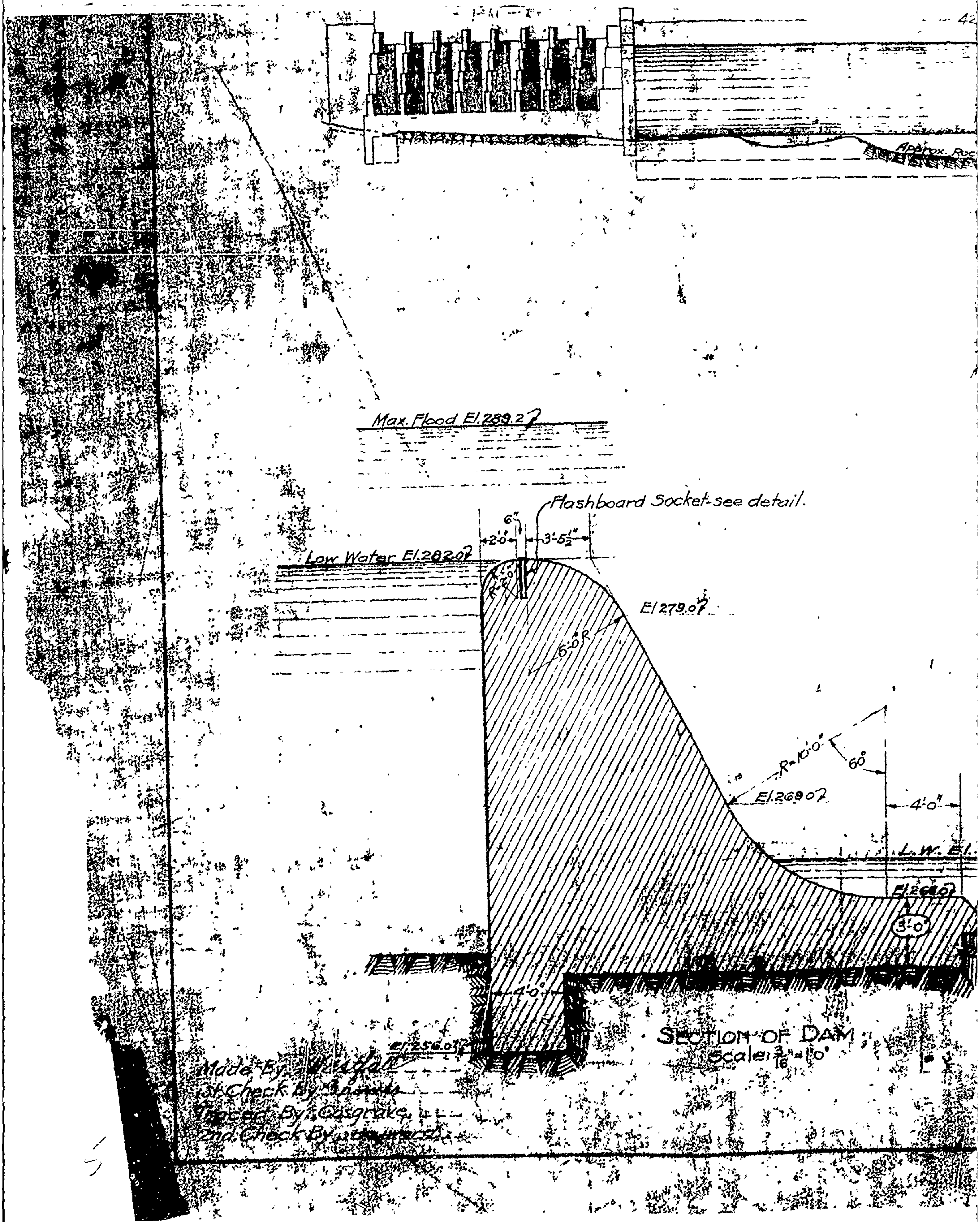


orth Bulkhead
For details of By-Pass. see Sheet #26
By-Pass
Lock #14
Lumber Conveyor
Lumber Conveyor
Mill
A
Flashboard Socket
2'-3"
12
3'-0"
3'-0"
3'-0"
3"ø W.I. Pipe 4'-
2'-0"
20'-0"
B
2'-0"
16'-0"
PLAN OF
Scale
2-2"x1
20'
2'-0"
3"ø Steel Pins-4'-
El 282.0
El. 274.0
El. 272.0
5"
1/4"
3/4"
6"
Cap to be made of Cast Iron 5" diam 3/4" thick. To be screwed to a 2½" Iron pipe.

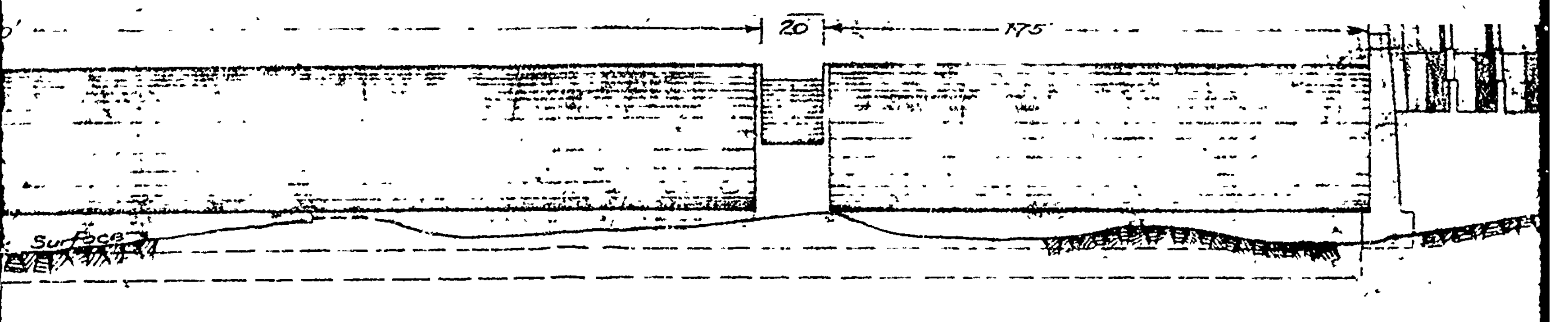


PLAN OF LOGWAY
Scale $\frac{3}{16}$"=1'0"





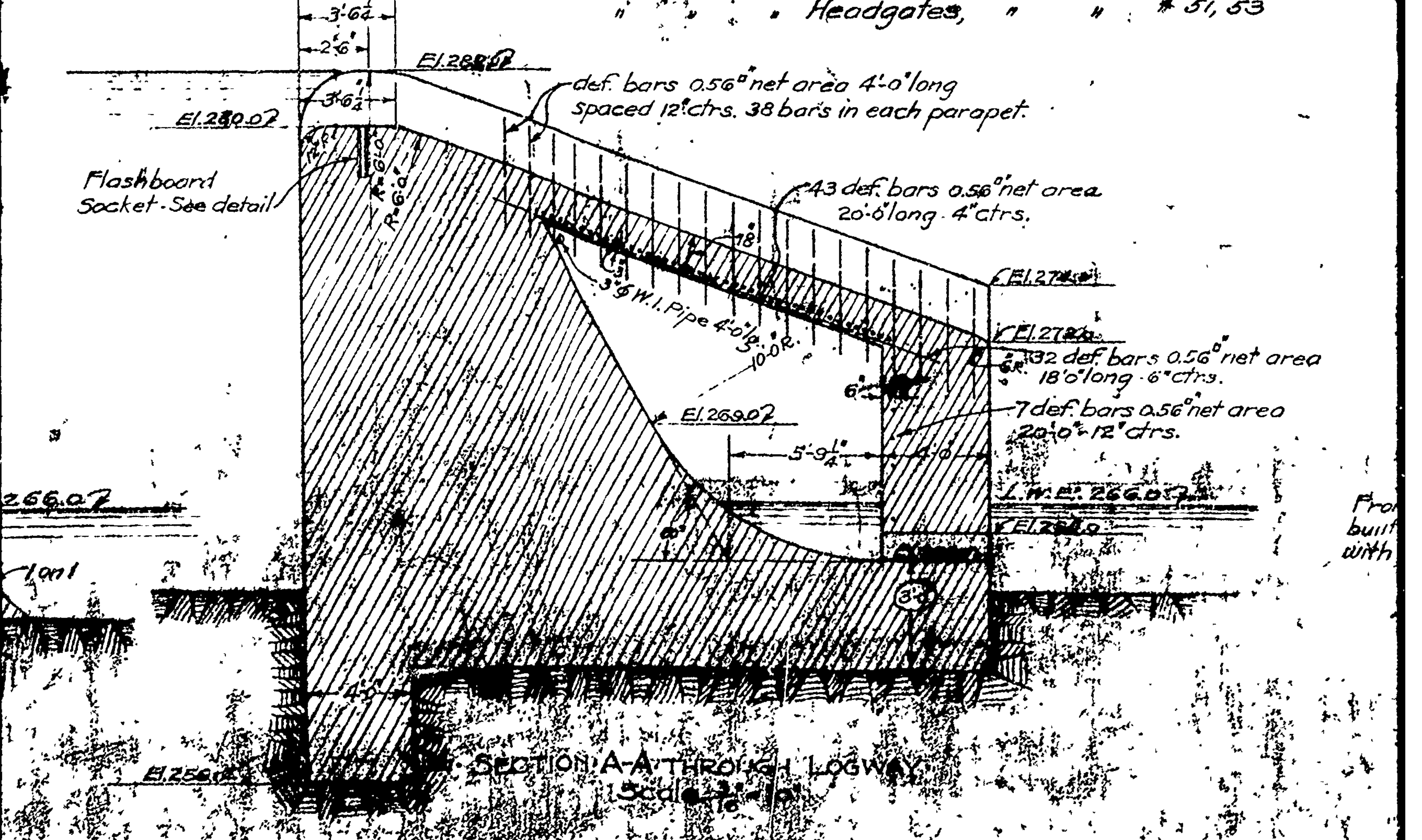
Max. Flood El. 289.2
Flashboard Socket-see detail.
6"
2'-0"
3'-5 1/2"
Low Water El. 282.0
El 279.0
6'-0" R
R=10'-0"
60°
El. 269.0
4'-0"
L. W. El.
5'-0"
4'-0"
El. 256.0
SECTION OF DAM
Scale: 3/16"=1'0"
Made By
1st Check By
Traced By
2nd Check By



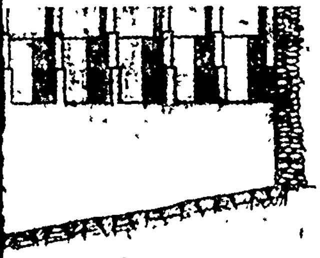
DOWN-STREAM ELEVATION OF DAM AND HEADGATES ·
Scales: HOR: 1"=50'. VERT. 1"=20'.

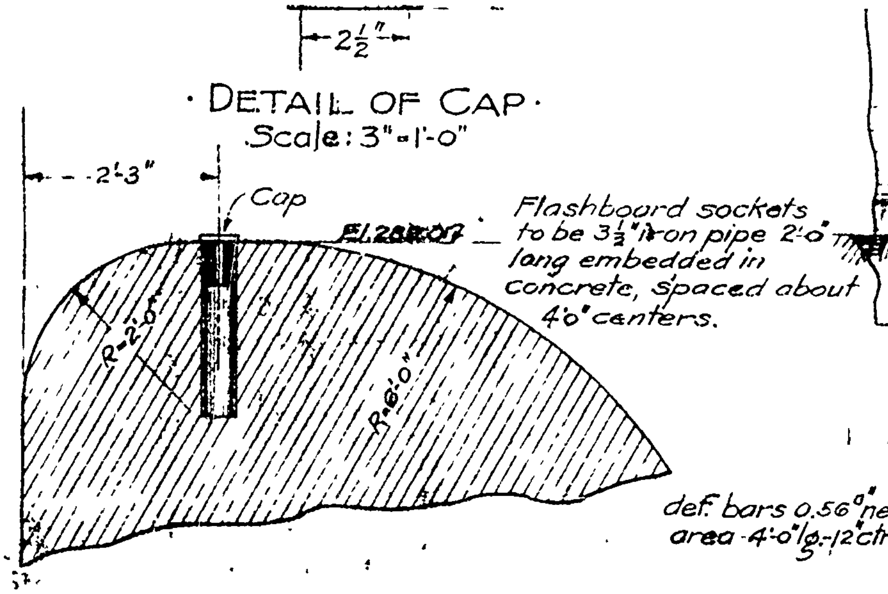
—NOTES—

All masonry shown on this sheet to be 2nd Class Concrete unless
All exposed edges of concrete to be rounded to a radius of
otherwise shown.
Vertical joints not to be spaced over forty (40') feet apart
All metal reinforcement to be of deformed bars of minimum
Size and spacing of bars may be changed slightly provid
section of steel remains unchanged.
The bases of the structures shown on any of the plans of
considered as approximate only and may be ordered b
writing to be at any elevation and of any dimensions ne
proper foundation.
For details of Bulkheads, see Sheets # 50, 52
" " " Headgates, " " # 51, 53

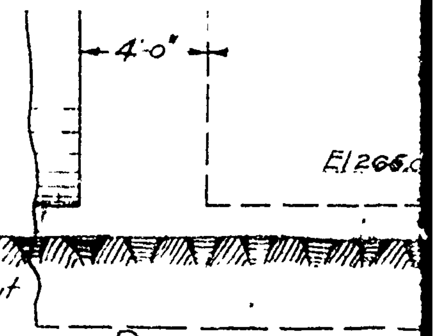


SECTION A-A THROUGH LOGWAY
Scale 3/16"=1'-0"

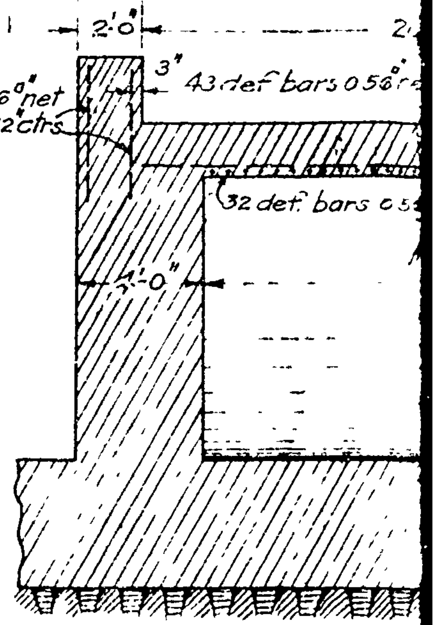




· Detail of Flashboard Socket ·
Scale ½"=1'0"



· Down-stream
Sc

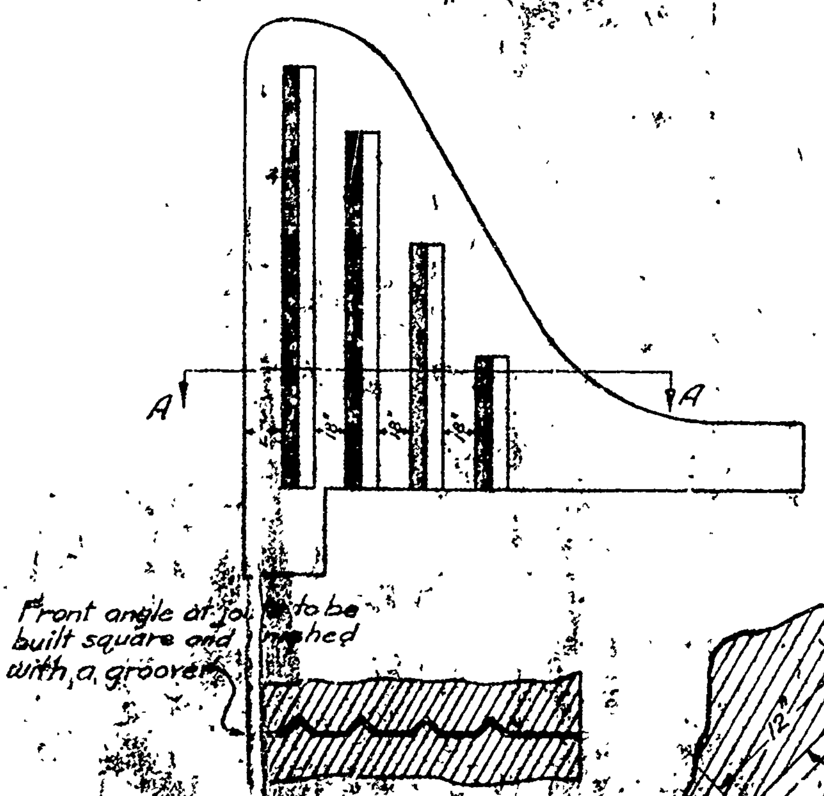


· Sect
Sc

unless otherwise shown.
...s of two inches unless

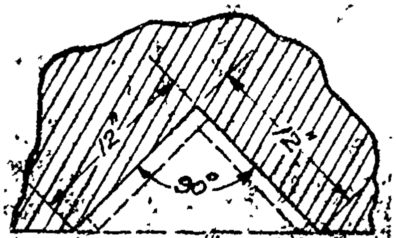
...part.
...nimum cross section given.
...rovided the total net

...ns of this contract shall be
...red by the State Engineer in
...ns necessary to give a



Section A-A

Area of Keyways to be between 25% and 40% of total area.



Section at End Form
Scale 1"=1'0"

· Detail of Keyways ·

Contr

Champlain Ca

Gle

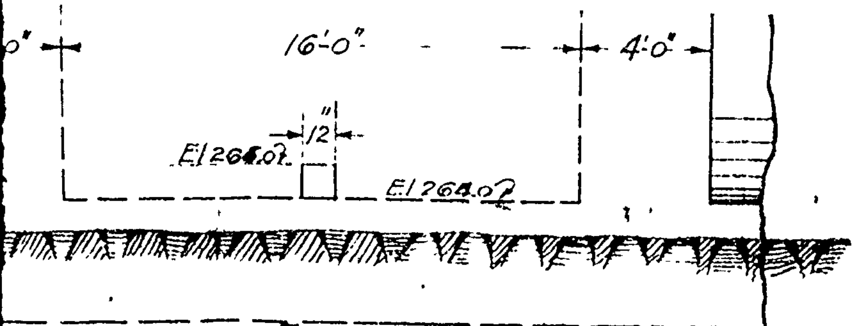
DETAIL PLAN OF G

Sca

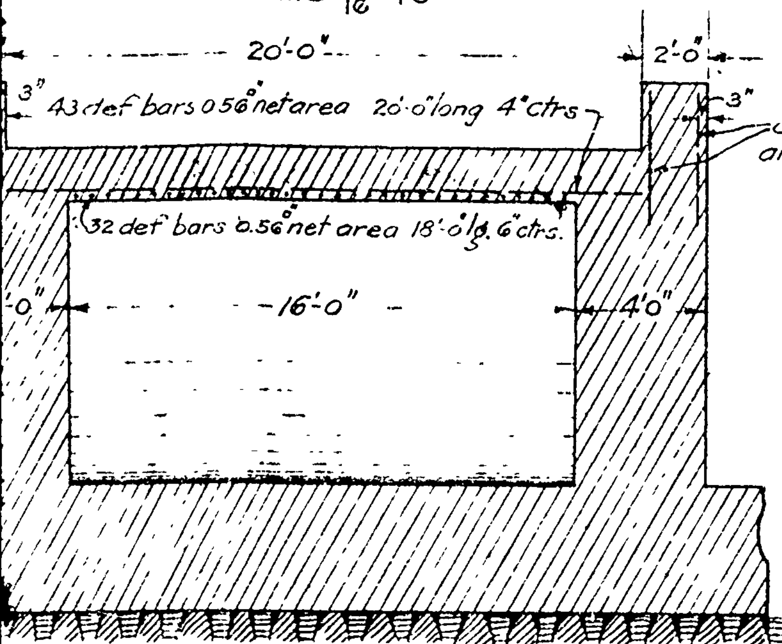
Examined and approved

July

Supervising Engineer



·DOWN-STREAM ELEVATION OF LOGWAY·
Scale $\frac{3}{16}$"=1'0"



·SECTION·B-B·
Scale: $\frac{3}{16}$"=1'0"

Contract No. 56.

mplain Canal — Section 2

Glens Falls Feeder.

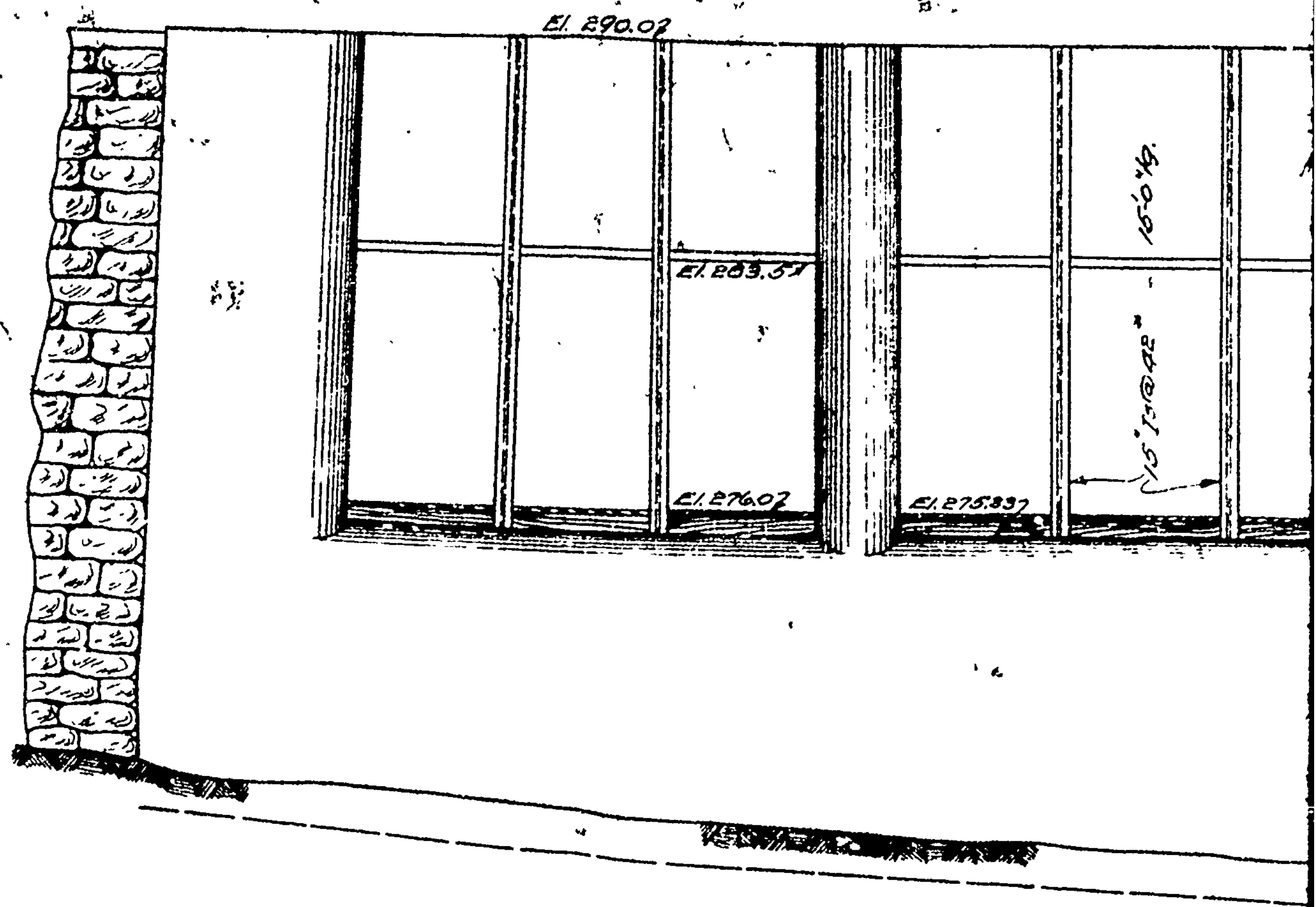
PLAN OF GLENS FALLS FEEDER DAM

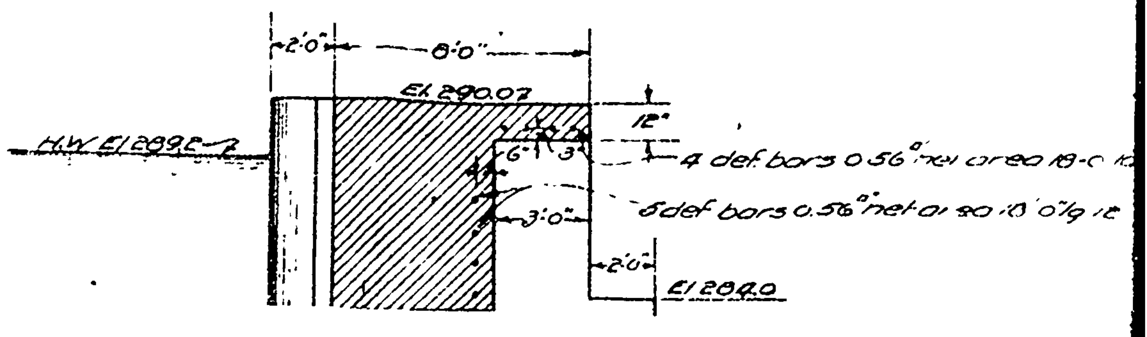
Scales as indicated

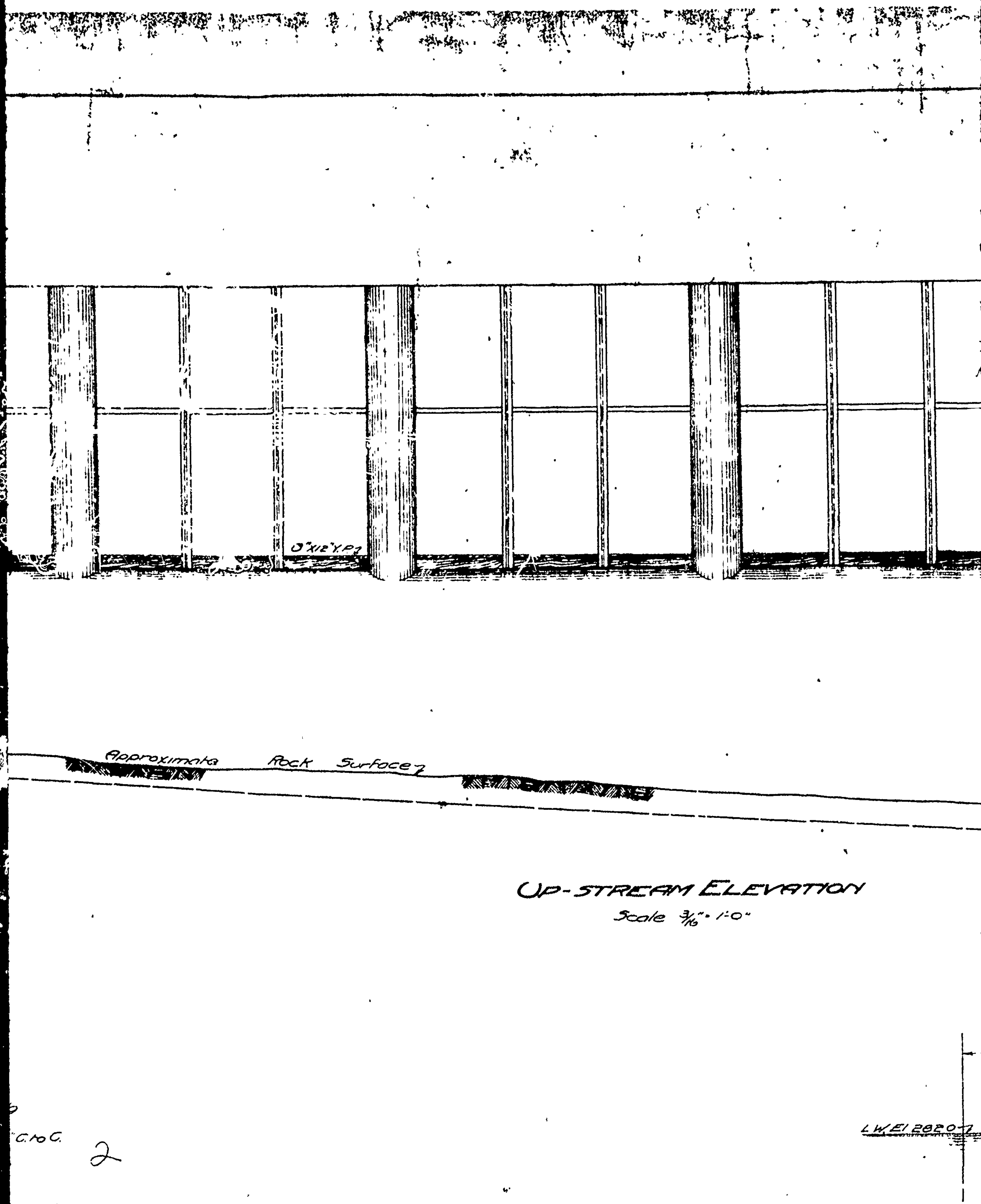
approved — Examined and approved

ly 1911

g Engineer — Special Deputy

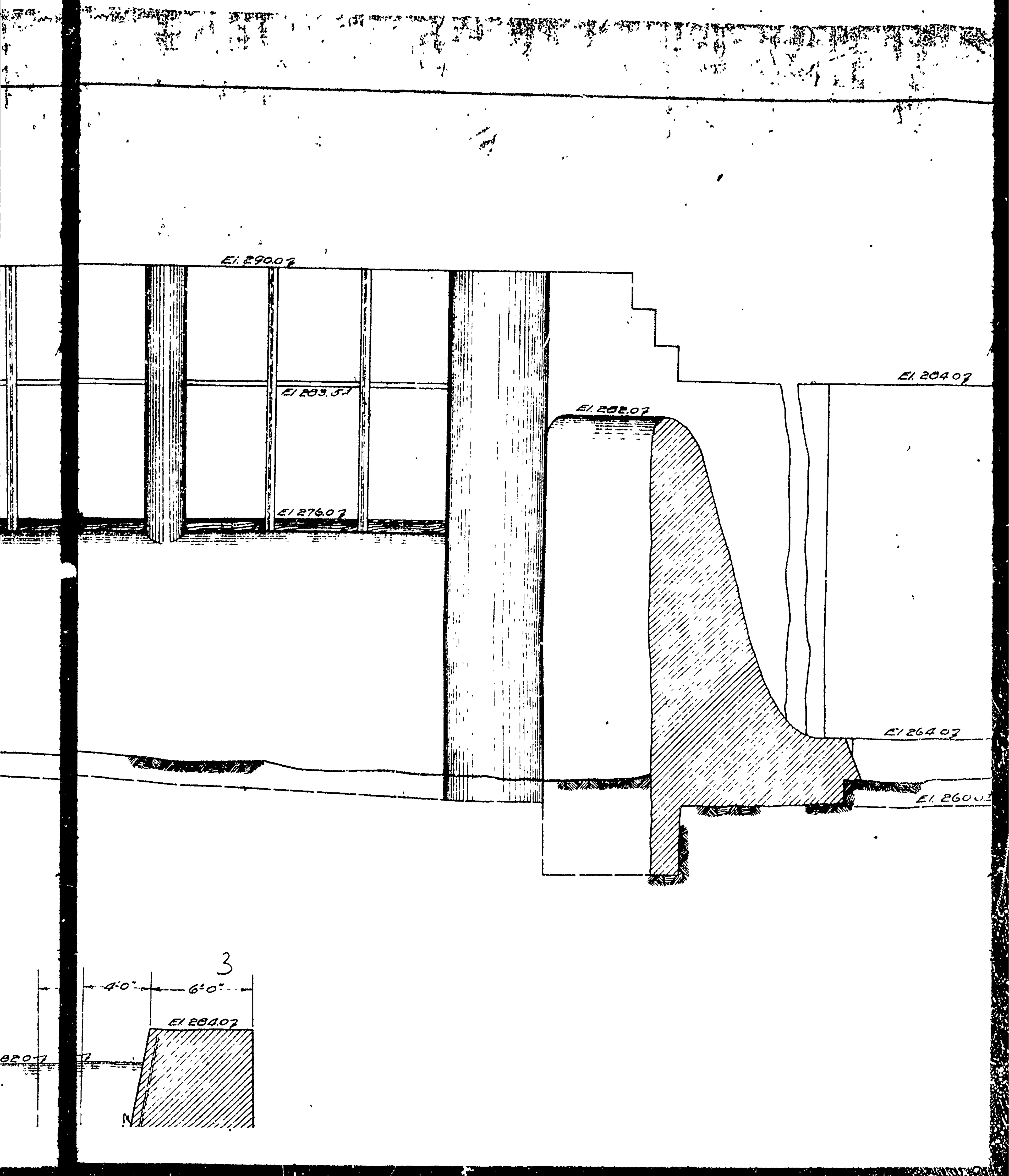

El. 290.07
El. 283.57
El. 276.07
El. 275.83
16'-0" lg.
15" I @ 42#


2'-0"
8'-0"
El. 290.07
12"
H.W. El. 289.8
6"
3"
3'-0"
2'-0"
El. 284.0

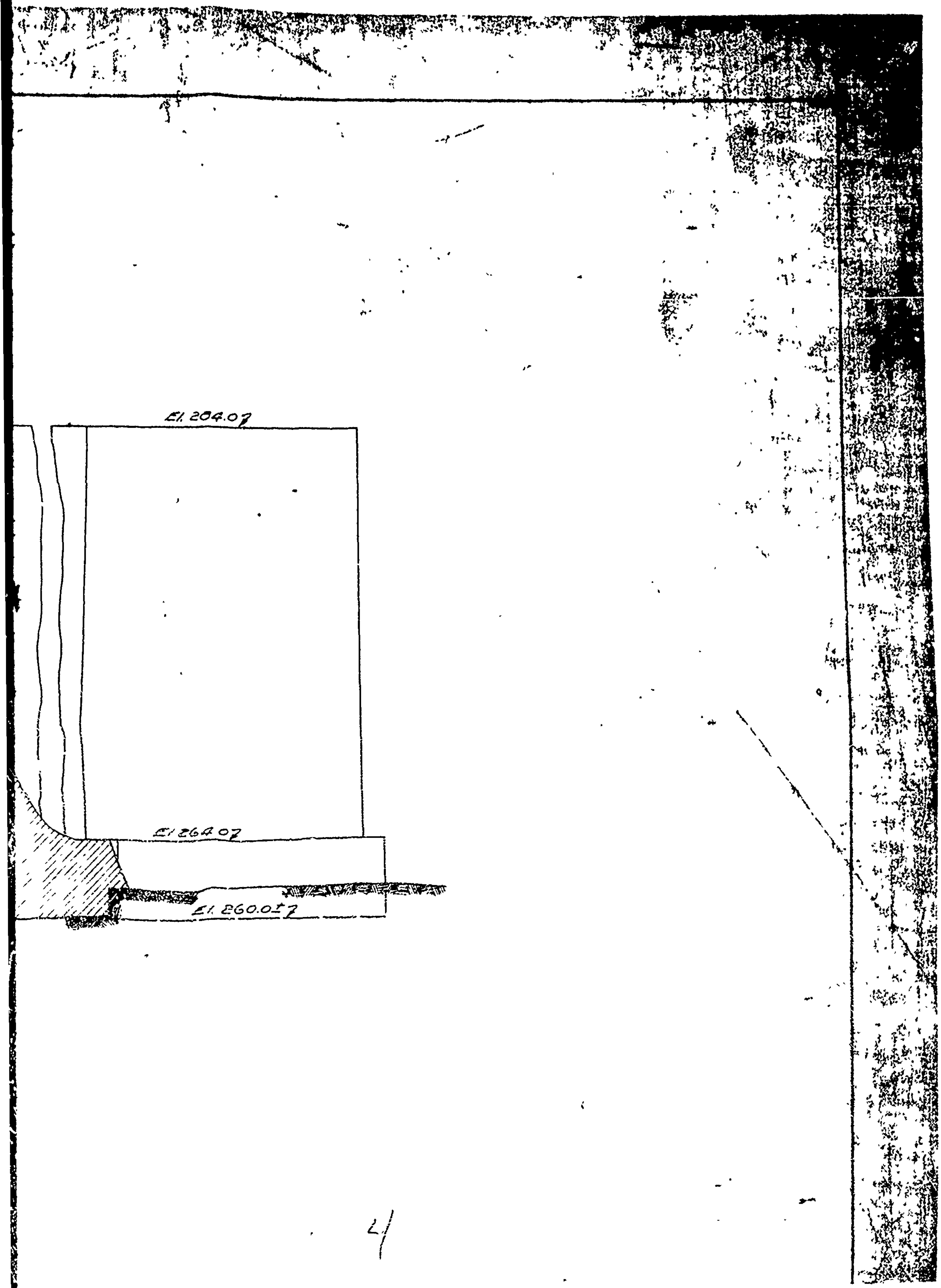


UP-STREAM ELEVATION
Scale 3/16" = 1'-0"

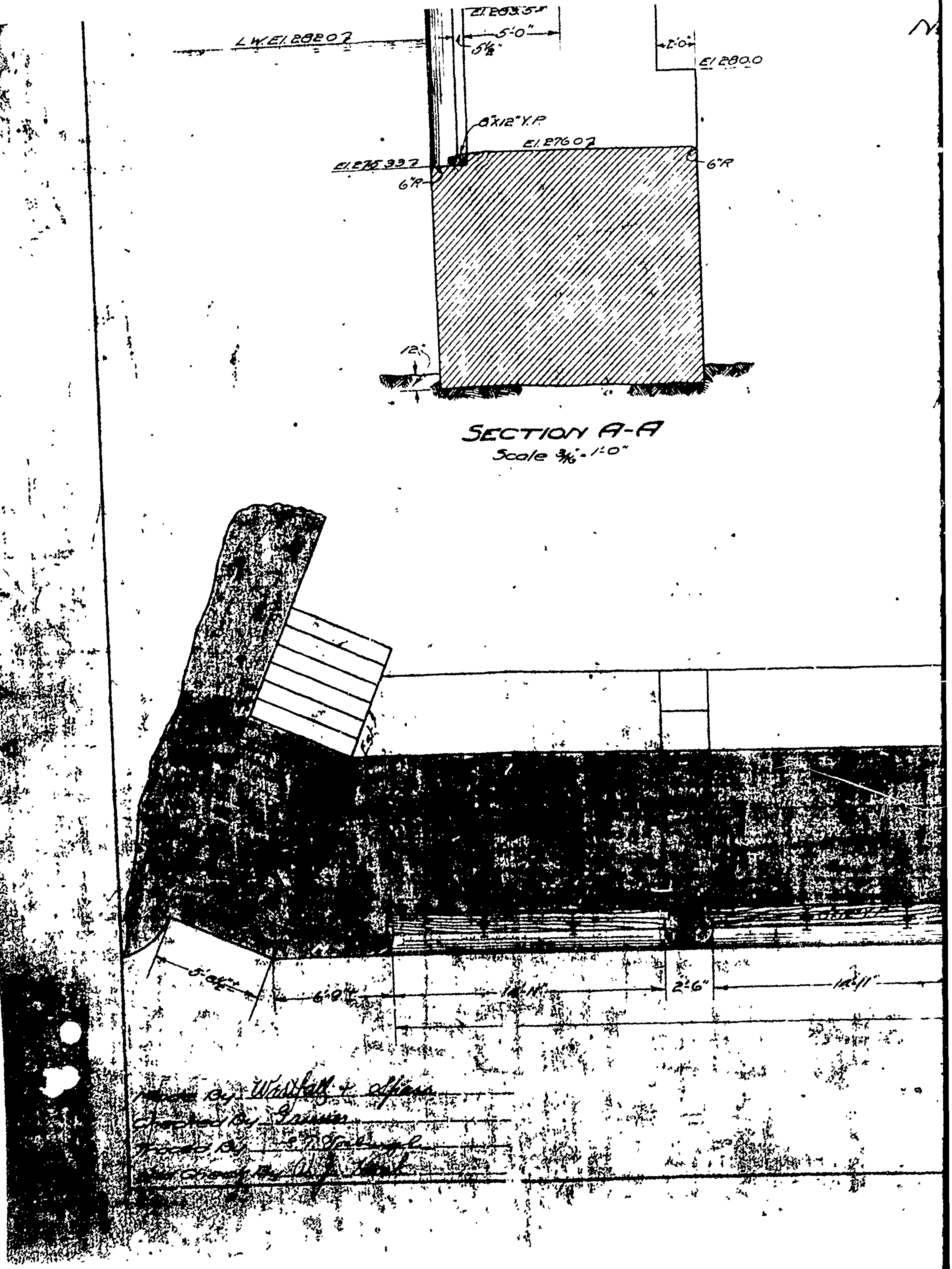
2



El. 290.07
El. 283.57
El. 282.07
El. 284.07
El. 276.07
El. 264.07
El. 260
3
4'-0"
6'-0"
El. 284.07



4



L.W. El. 282.07
El. 283.5
5'-0"
5½"
2'-0"
El. 280.0
8"x12" Y.P.
El. 276.07
El. 275.337
6"R
6"R
12"
SECTION A-A
Scale 3/16" = 1'-0"
6'-0"
2'-6"

NOTES:

All masonry shown on this sheet to be 2nd Class Concrete unless otherwise shown.

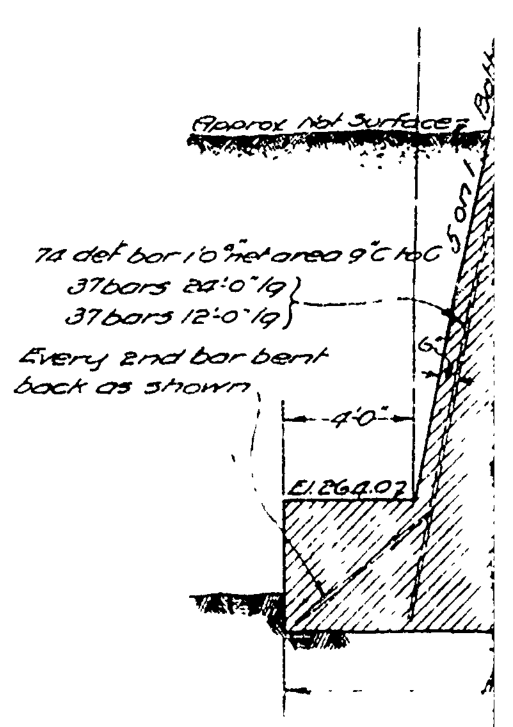
All exposed edges of concrete to be rounded to a radius of two inches unless otherwise shown.

The bases of structures on any of the plans of this contract shall be considered as approximate only, and may be ordered by the State Engineer in writing to be at any elevation and of any dimension necessary to give a proper foundation.

All metal reinforcement shall be of deformed bars of minimum cross section given. The size and spacing of bars may be changed slightly provided the total net section of steel remains unchanged.

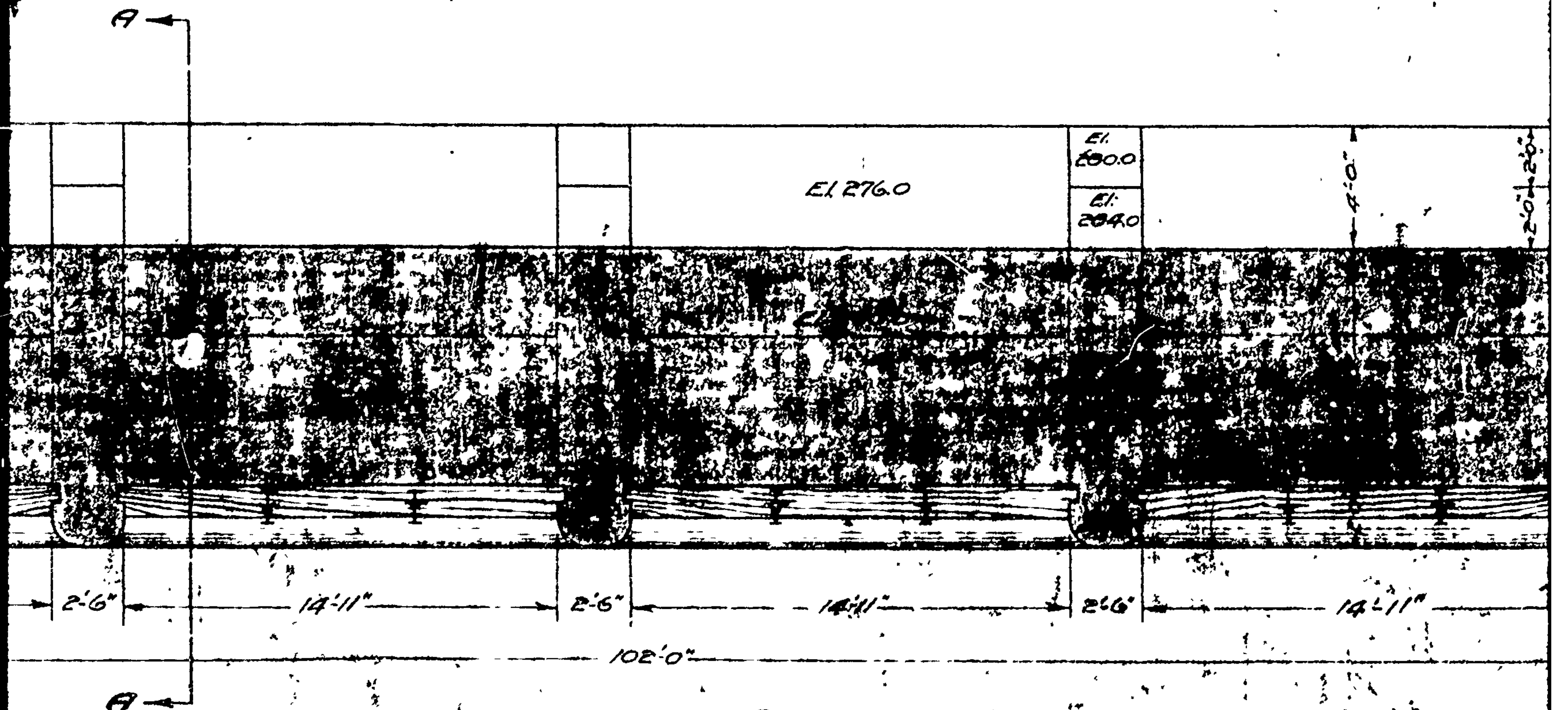
For details of Head Gates, see sheet No. 51.

For layout plan, see sheet No. 49



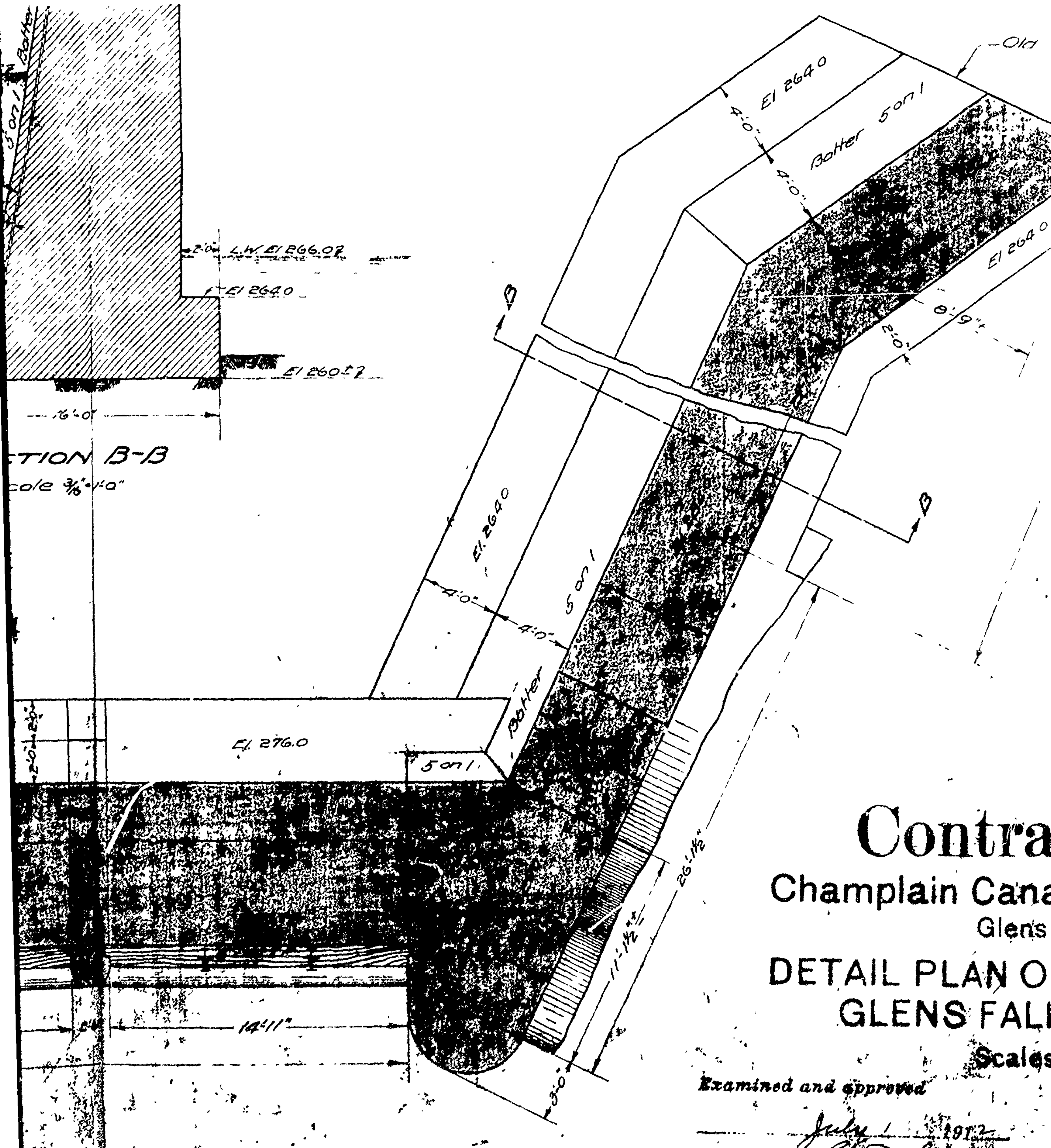
SECT

Scal



PLAN

Scale 3/16"=1'0"



Contrac

Champlain Canal

Glens F

DETAIL PLAN OF

GLENS FALLS

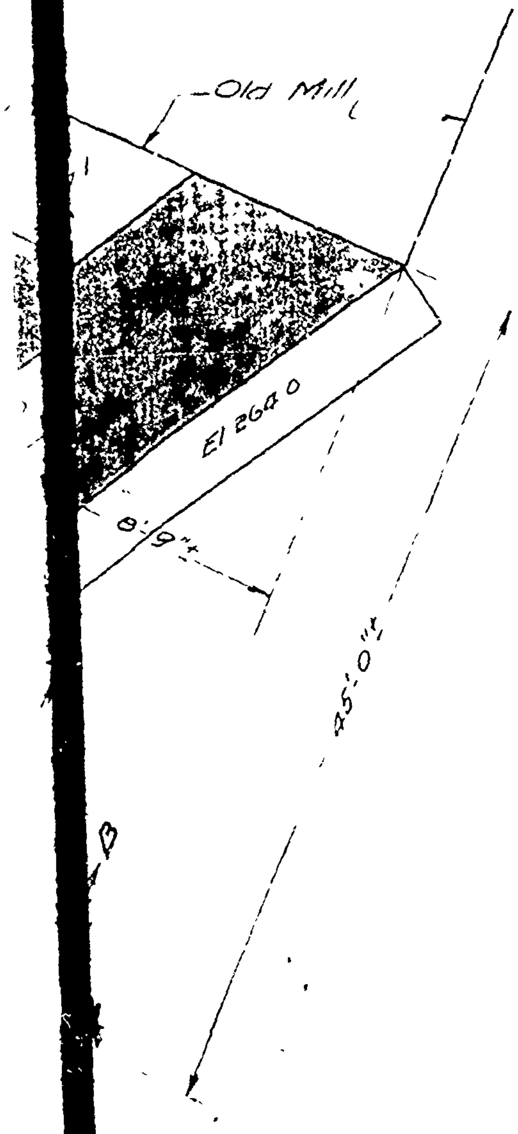
Scales a

Examined and approved

July 1 1912

G. F. Stickney

Supervising Engineer



ontract No. 56.

ain Canal Section 2

Glens Falls Feeder.

PLAN OF NORTH BULKHEAD, NS FALLS FEEDER DAM

Scales as indicated

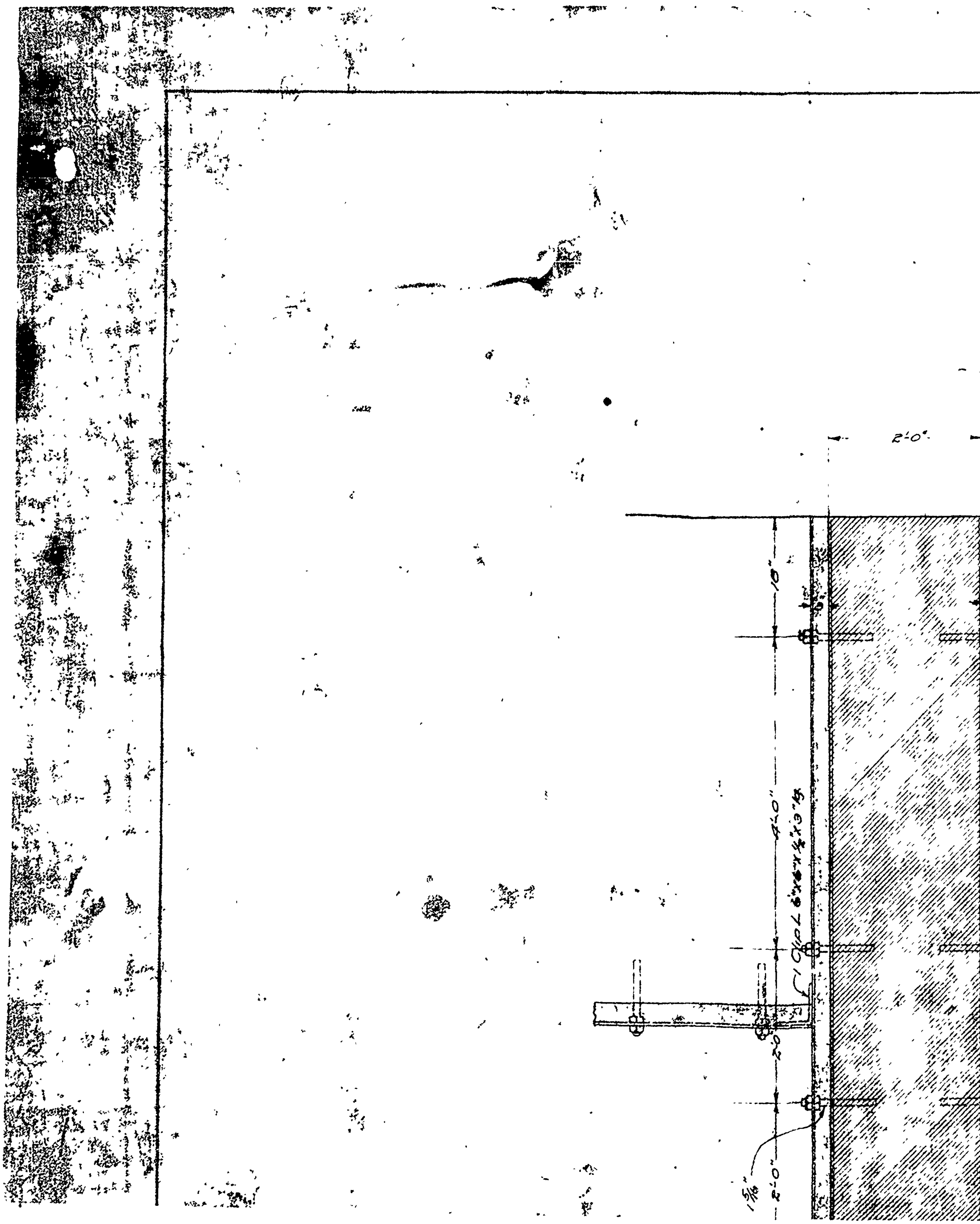
Examined and approved

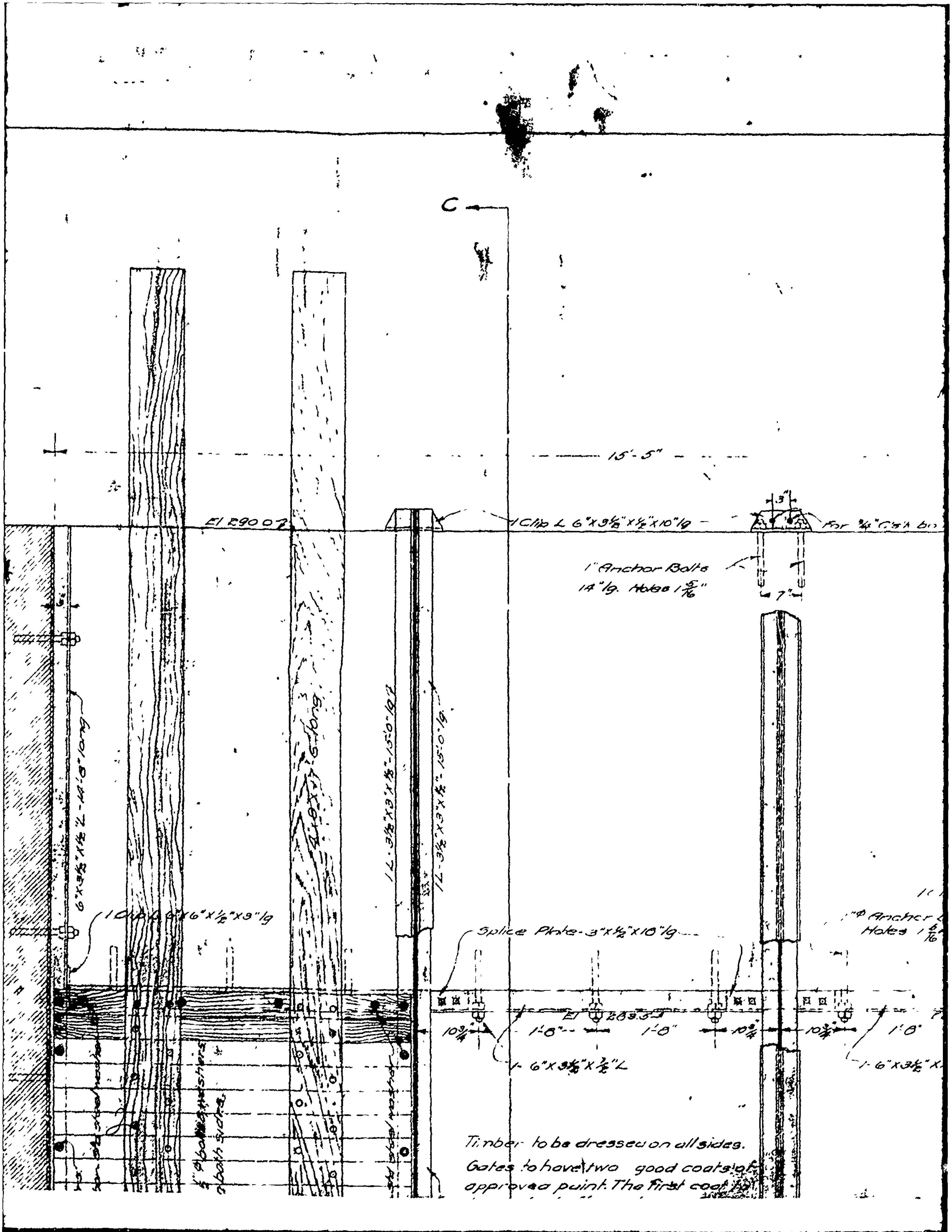
...1912

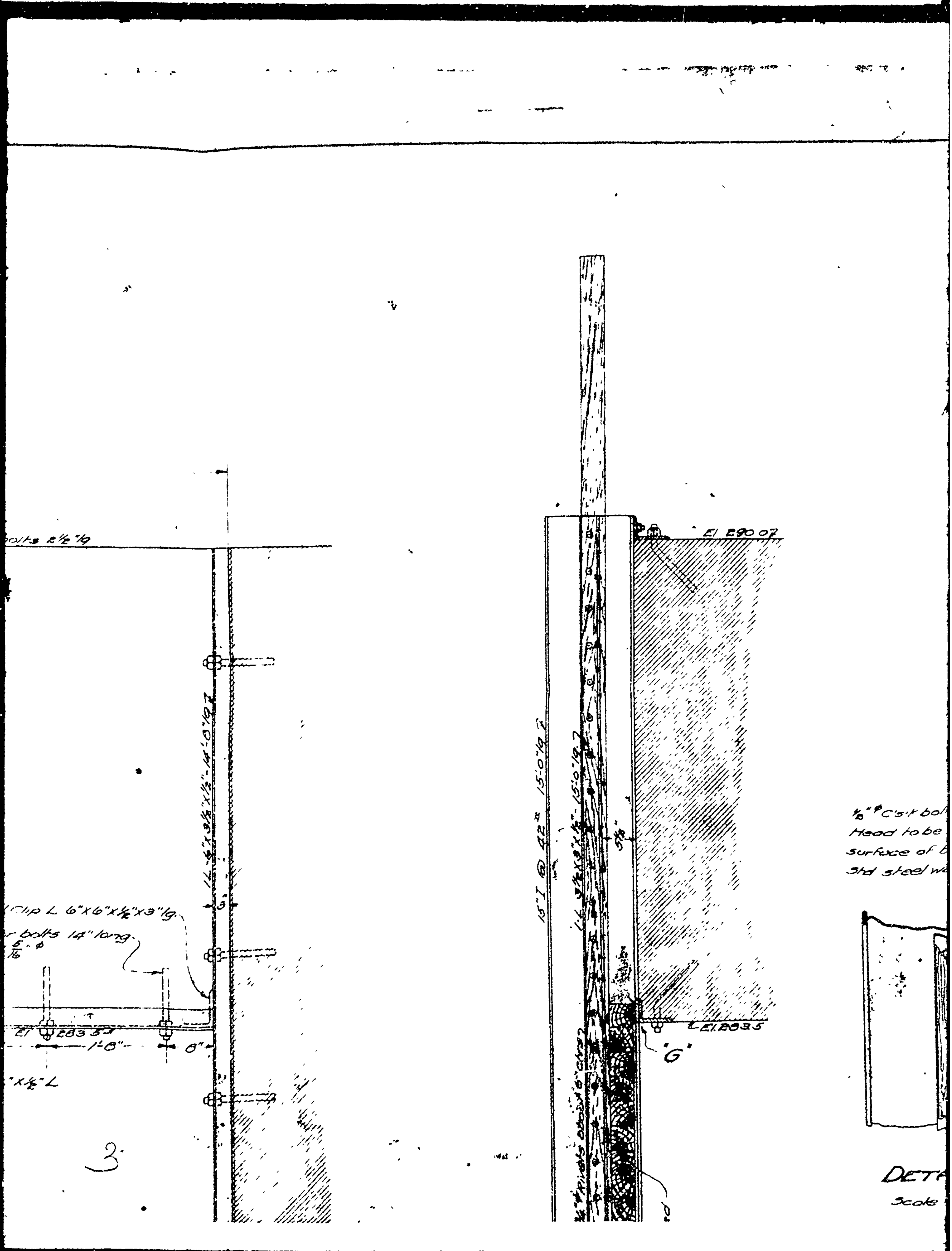
Special Deputy State Engineer

50

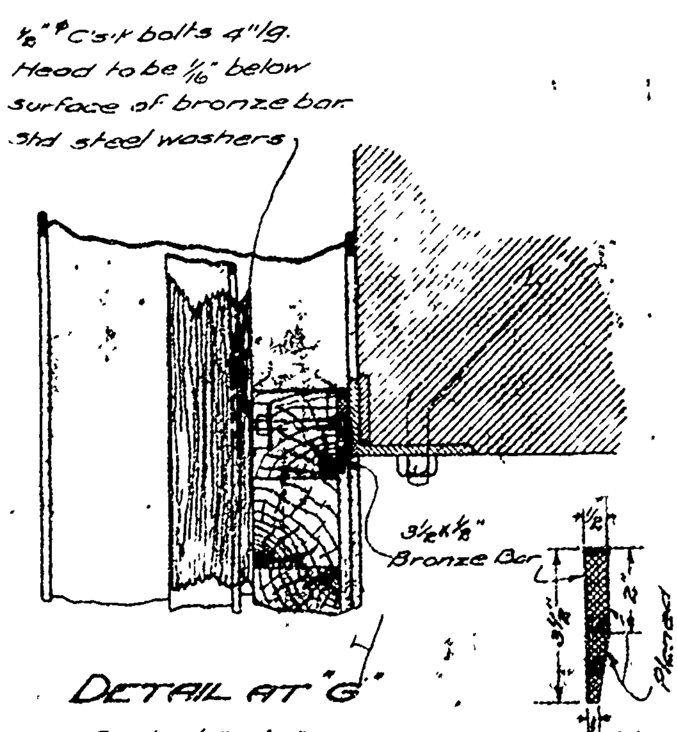
8


2'-0"
10"
4'-0"
2'-0"
2'-0"


C
15'-5"
El 290.07
1 Clip L 6"x3½"x½"x10" lg
3"
1" Anchor Bolts
14" lg. Holes 1 5/16"
7"
6"x3½"x½" L-14'-8" long
1 Clip L 6"x6"x½"x9" lg
1 L-3½"x3"x⅜"-15'-0" lg
Splice Plate-3"x½"x10" lg
10¾"
1'-8"
1'-8"
10¾"
10¾"
1'-8"
1-6"x3½"x½" L
Timber to be dressed on all sides.
Gates to have two good coats of
approved paint. The first coat to

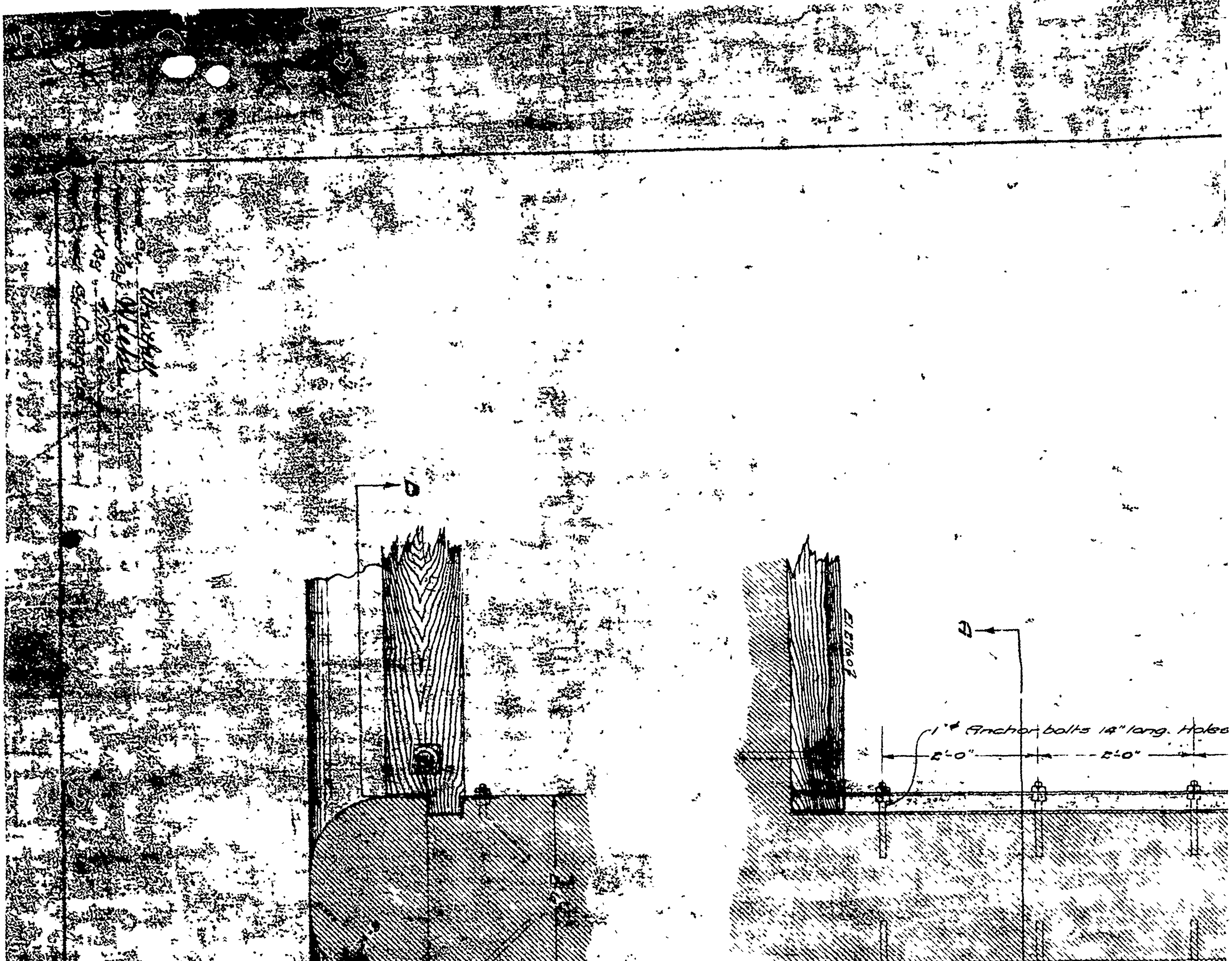


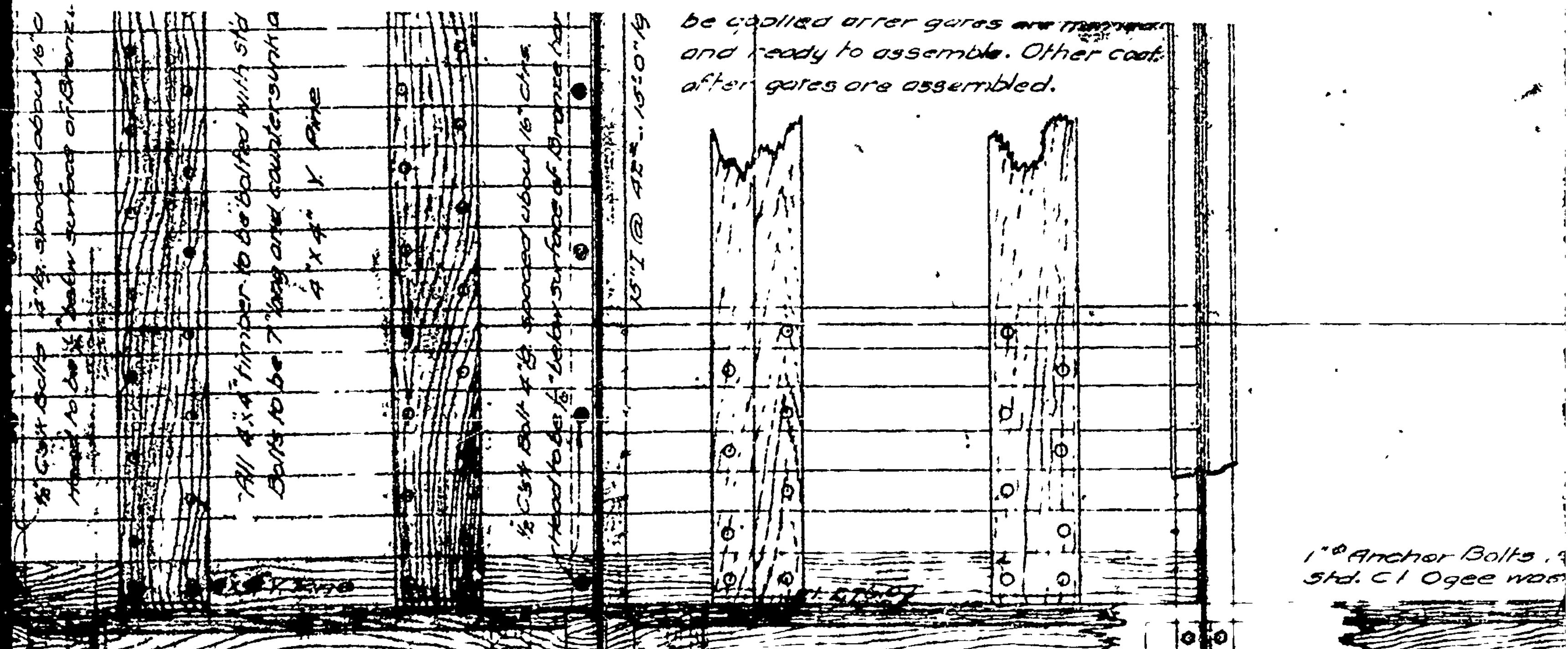
bolts 2½" lg
El 290.07
1 L 6"x3½"x½" - 14'-0" lg
15" I @ 42# 15'-0" lg
1 L 3½"x3"x⅜" - 15'-0" lg
5⅝"
1 Clip L 6"x6"x½"x3" lg.
bolts 14" long.
3"
El 283.5
1'-8"
8"
"G"
x½" L
3
DETA
Scale



DETAIL AT "G"

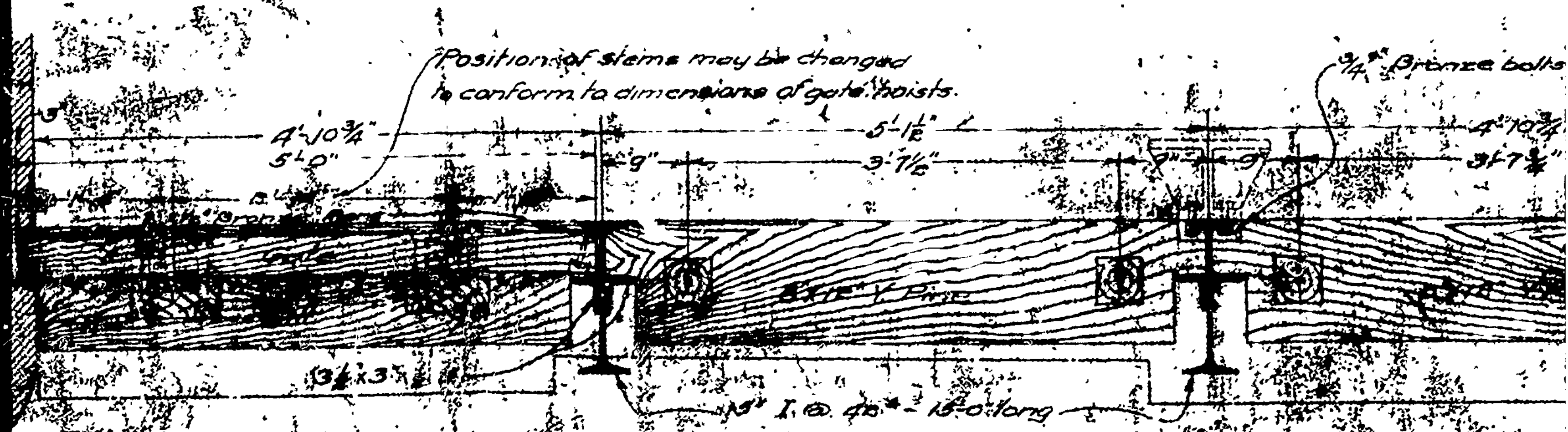
Scale 1½" = 1'-0"


1" Anchor bolts 14" long. Holes
2'-0"
2'-0"
El. 276.0
A
B
Westfall
Weeks
Cosgrove



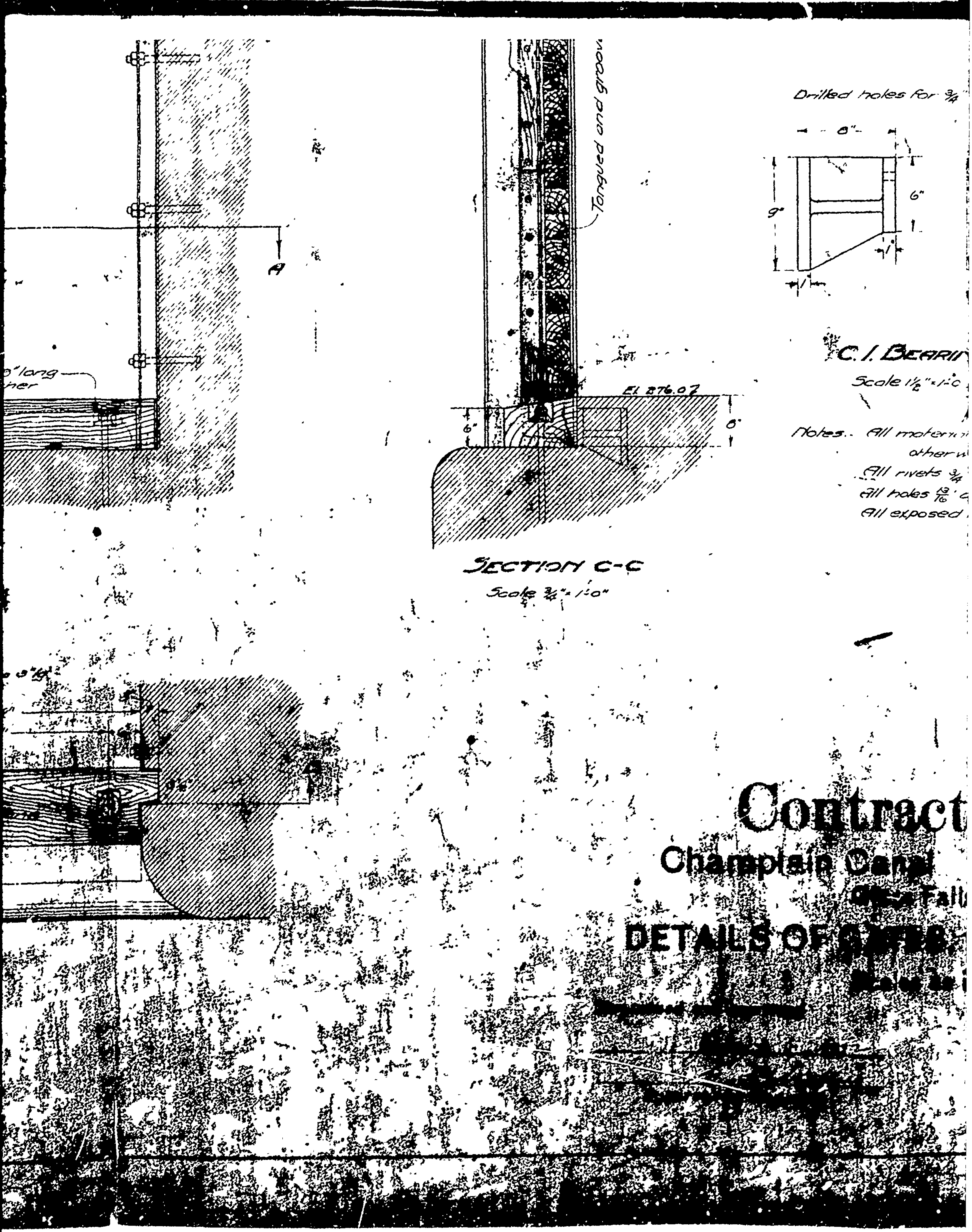
SECTION B-B

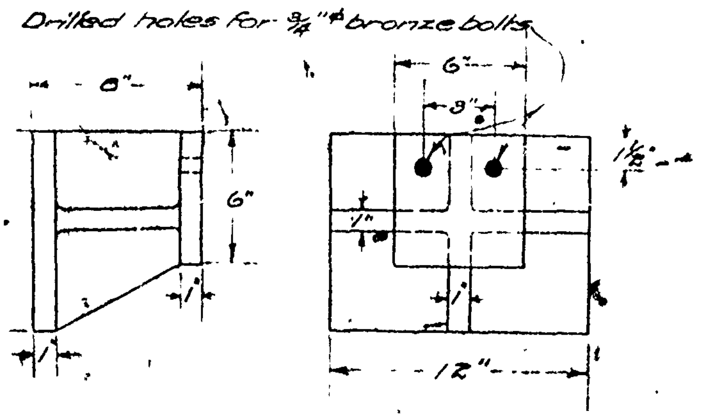
Scale 3/4" = 1'-0"



SECTION A-A

Scale 3/4" = 1'-0"


Drilled holes for 3/4"
8"
6"
9"
Tongued and groov
A
El. 276.07
6"
6"
SECTION C-C
Scale 3/4" = 1'-0"
C. I. Bearin
Scale 1½" = 1'-0
Notes.. All materi
otherw
All rivets 3/4
All holes 13/16
All exposed
Contract
Champlain Canal
DETAILS OF



C. I. BEARING

Scale 1½" = 1'-0"

Notes.- All material medium open hearth steel unless otherwise noted.

All rivets ¾" diameter.

All holes 13/16" diameter unless otherwise noted.

All exposed faces of bronze to be planed.

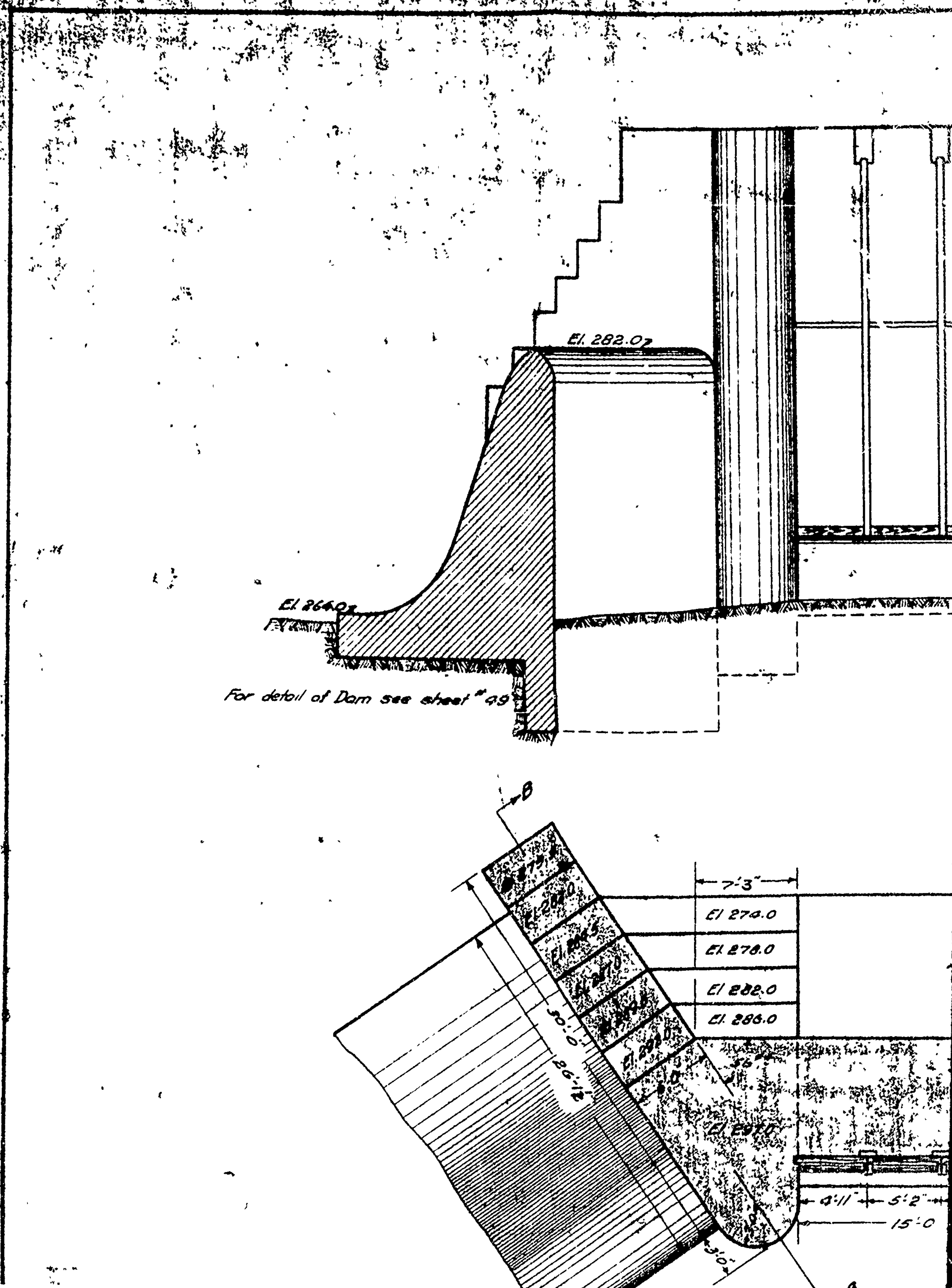
ontract No. 56.

aig Canal Section 2

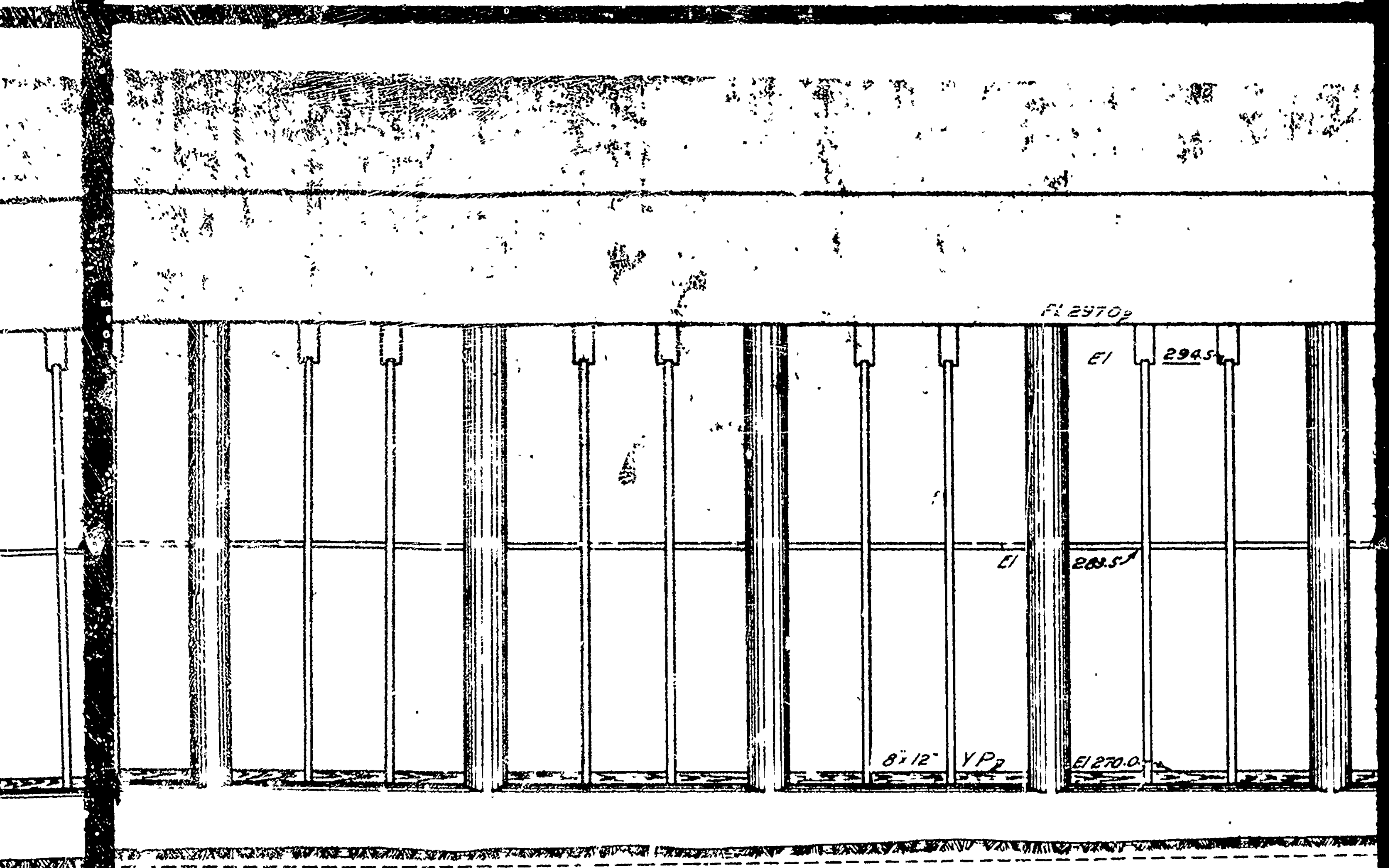
Falls Feeder.

OF GATES, NORTH BULKHEAD

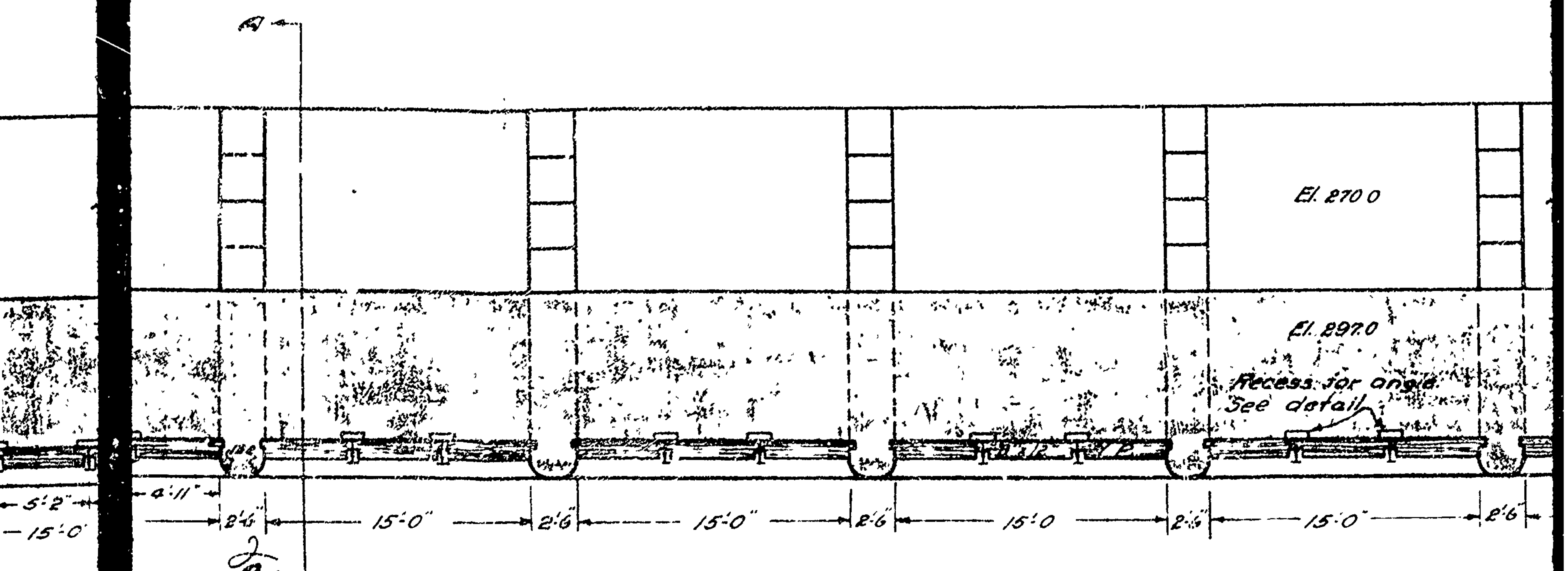
Scale as indicated



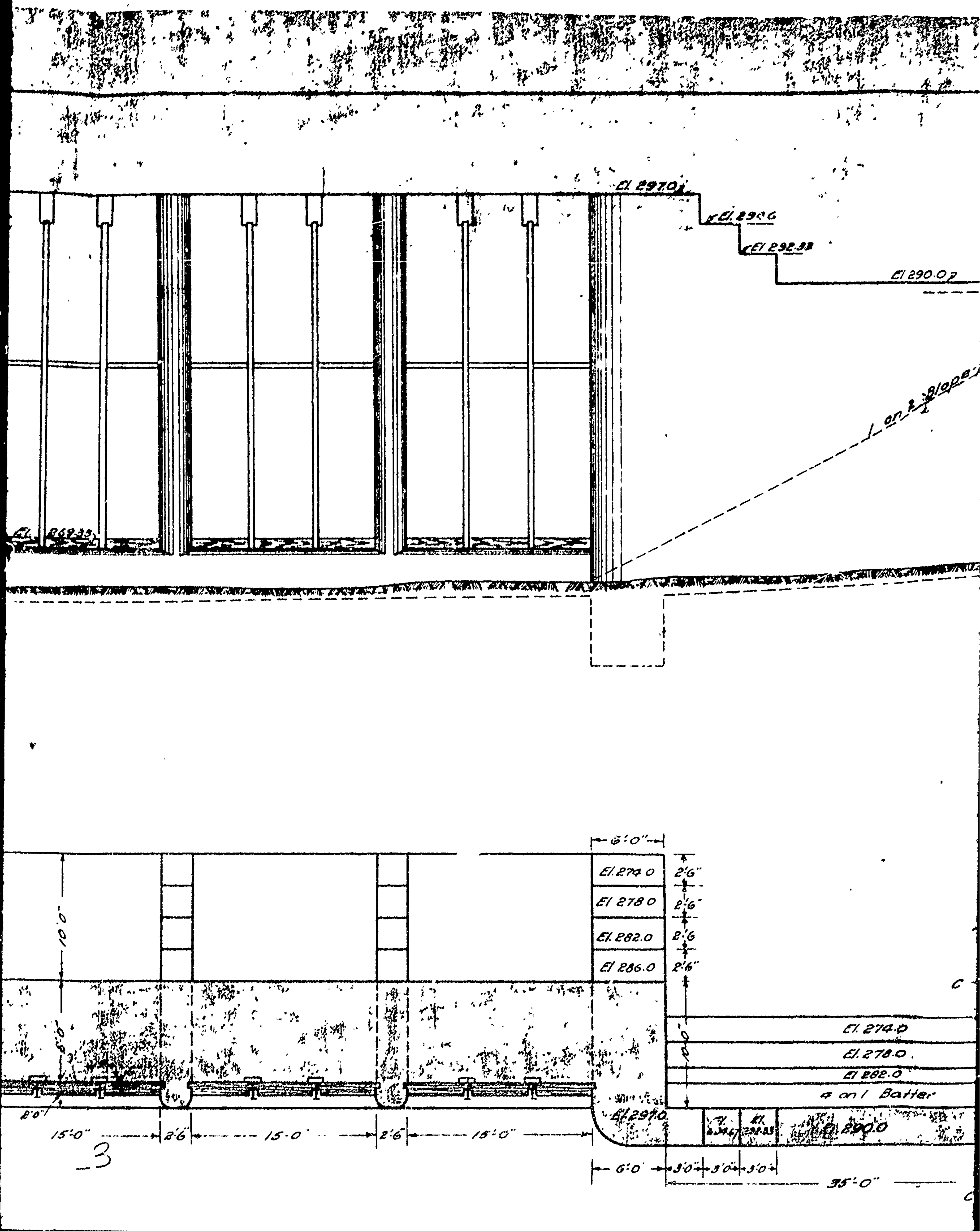
El. 282.0
El. 264.0
For detail of Dam see sheet # 49
B
7'-3"
El 274.0
El 278.0
El 282.0
El 286.0
30'-0"
26'-1½"
3'-0"
4'-11"
5'-2"
15'-0"



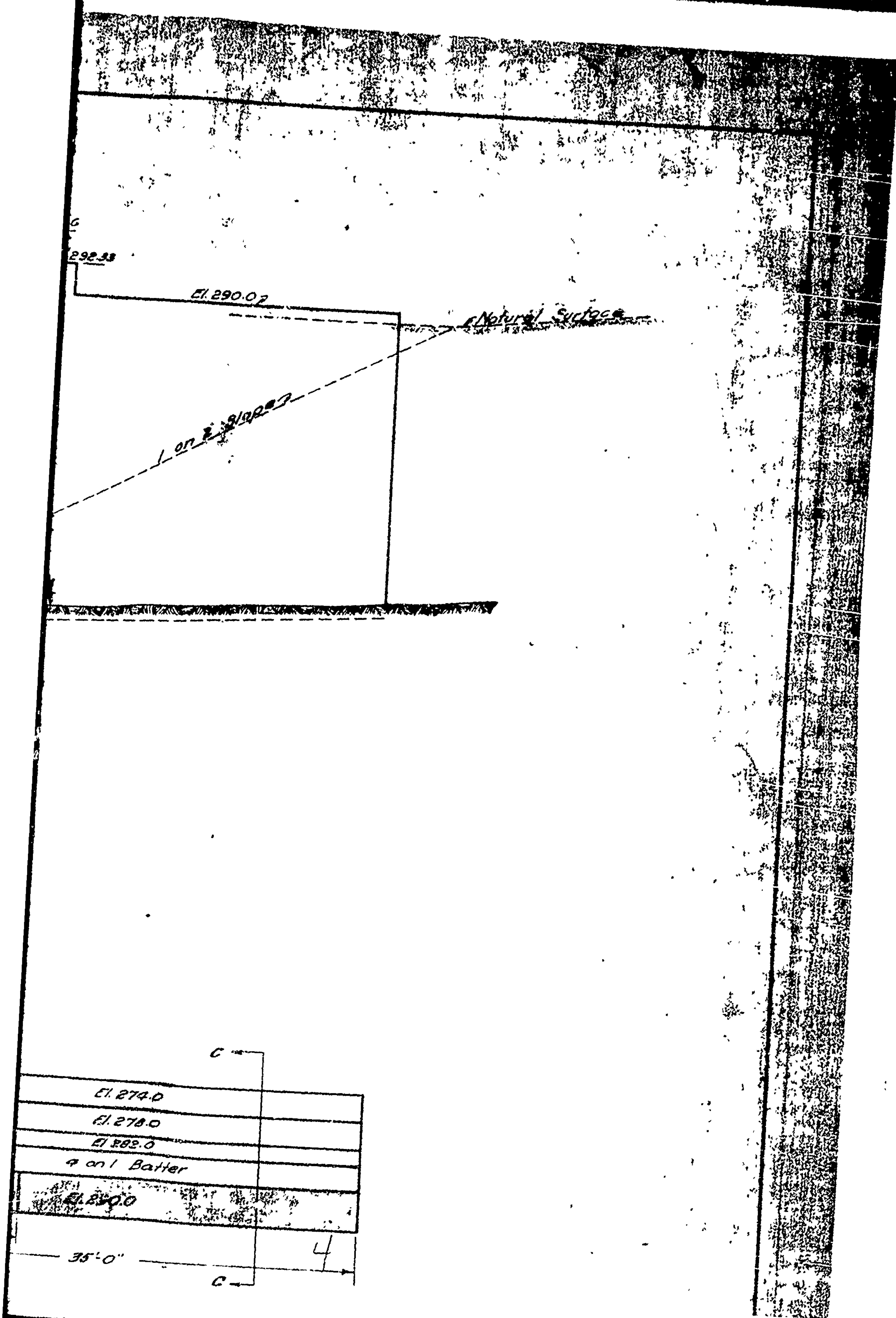
UP STREAM ELEVATION
Scale $\frac{1}{8}$" = 1'-0"



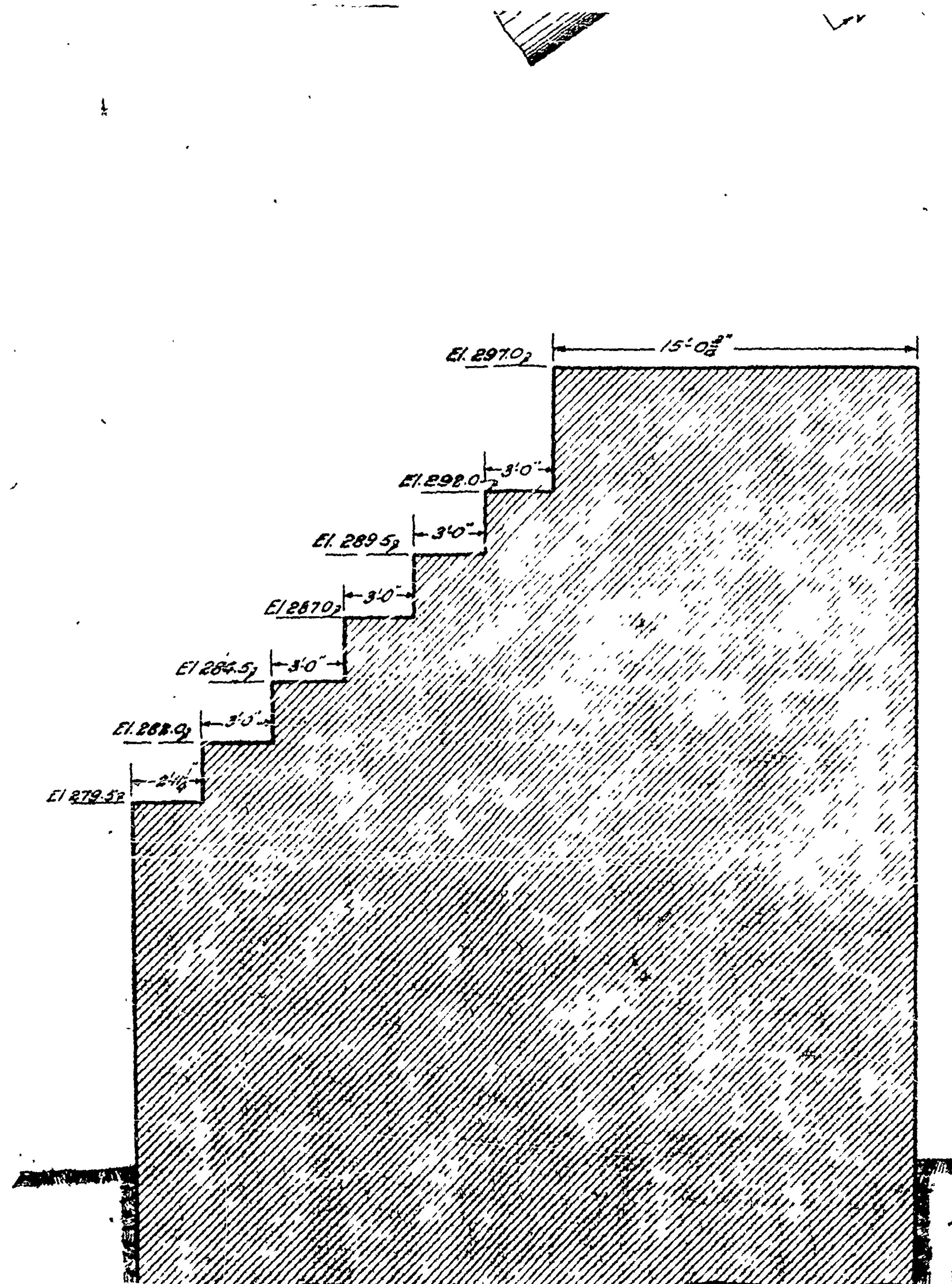
PLAN



El. 297.0
El. 292.33
El 290.0
1 on 2 Slope
El. 269.33
6'0"
El. 274.0
El 278.0
El. 282.0
El 286.0
2'6"
10'0"
8'0"
15'0"
15'0"
15'0"
2'6"
El. 274.0
El. 278.0
El 282.0
4 on 1 Batter
El. 297.0
El. 290.0
6'0"
3'0"
35'0"
3



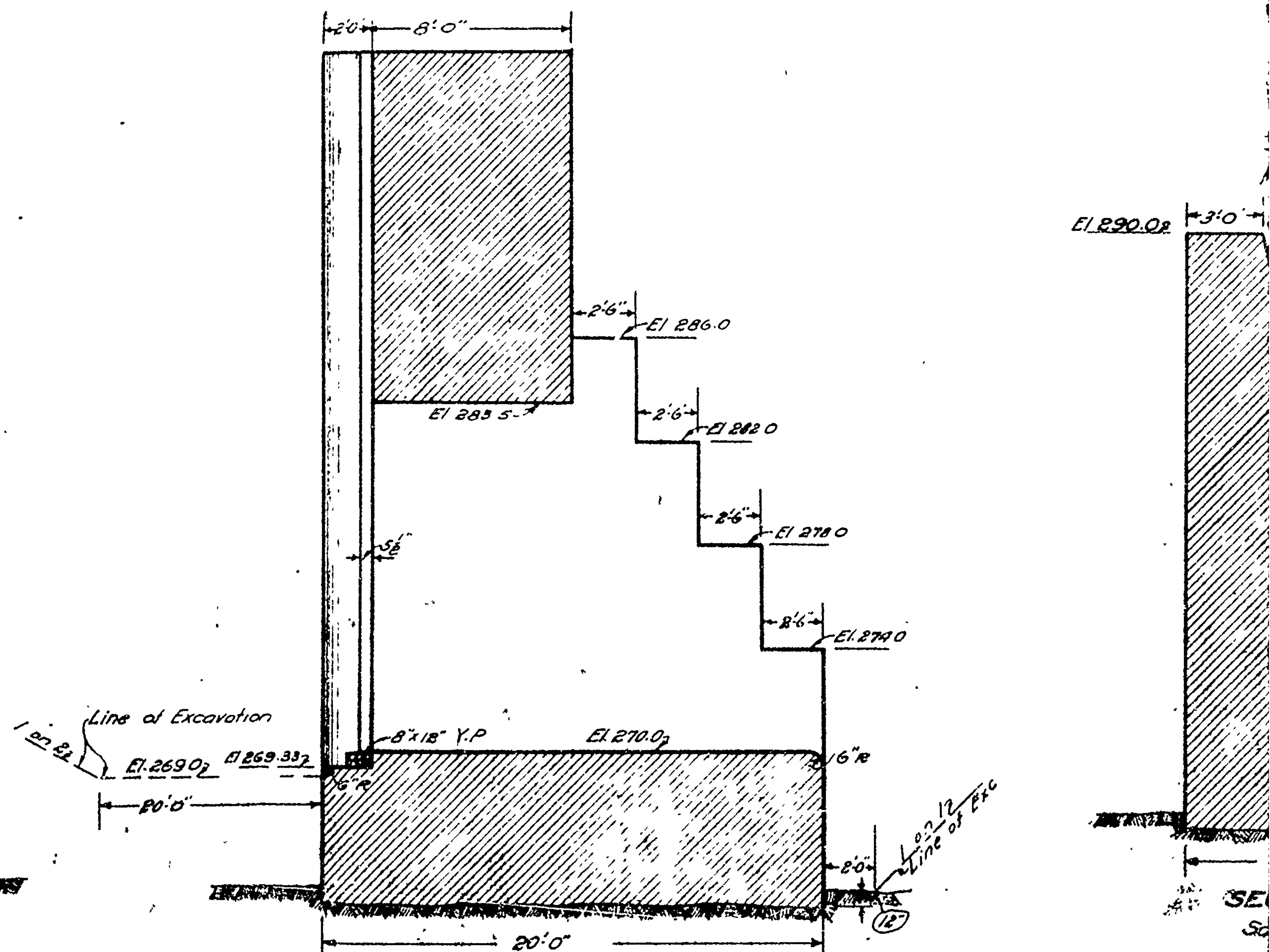
292.33
El. 290.07
Natural Surface
1 on 2 Slope
C
El. 274.0
El. 278.0
El. 283.0
4 on 1 Batter
El. 290.0
35'-0"
C



SECTION B-B
Scale: 3/16" = 1'-0"

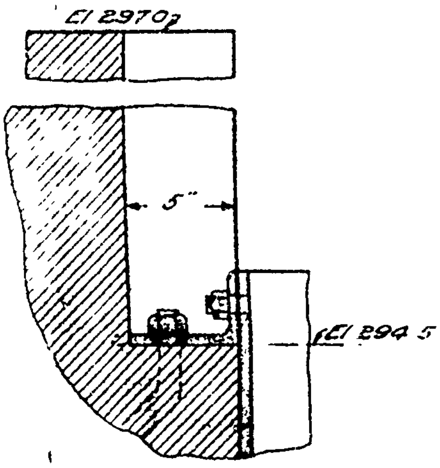
Made By [illegible]
Checked By [illegible]
Traced By [illegible]
2nd Check By [illegible]

Scale $\frac{1}{8}$" = 1'-0"



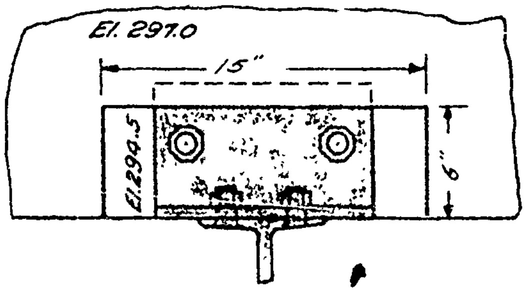
SECTION A-A.
Scale: $\frac{3}{16}$" = 1'-0"

6.

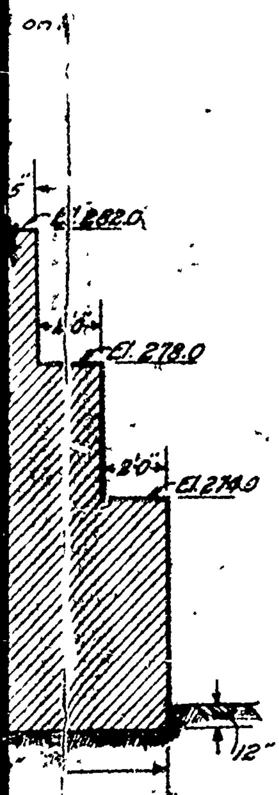


ECTIONAL ELEVATION

Notes:-
All masonry shown on this
unless otherwise shown
All exposed edges of conc
of two inches unless otherwis
The bases of structures sh
contract shall be considered
be ordered by the State Eng
evation and of any dimensic
foundation.
For detail of Head Gates
For layout plan see shee



PLAN
DETAILS FOR ANGLE RECESS
Scale 1½" = 1'0"



ON C-C

Contract

ALTERATION NO. I SH

Champlain Canal

Glens Falls Fe

DETAIL PLAN OF SOU
GLENS FALLS F

Scales as indic

Examined and approved
Mar 6 1913
[signature]
Supervising Engineer.

es -
All masonry shown on this sheet to be second class concrete
nless otherwise shown
All exposed edges of concrete to be rounded to a radius
f two inches unless otherwise shown
The bases of structures shown on any of the plans of this
ontract shall be considered as approximate only, and may
e ordered by the State Engineer in writing to be of any el-
vation and of any dimensions necessary to give a proper
oundation
For detail of Head Gates, see sheet N°s 53 & 70
For layout plan, see sheet N° 49

ontract No. 56.

ALTERATION NO. 1 SHEETS 61 TO 70 INC.

plain Canal Section 2

Glens Falls Feeder

PLAN OF SOUTH BULKHEAD,
GLENS FALLS FEEDER

Scales as indicated

ved

6 1913

Stickney

ngineer.

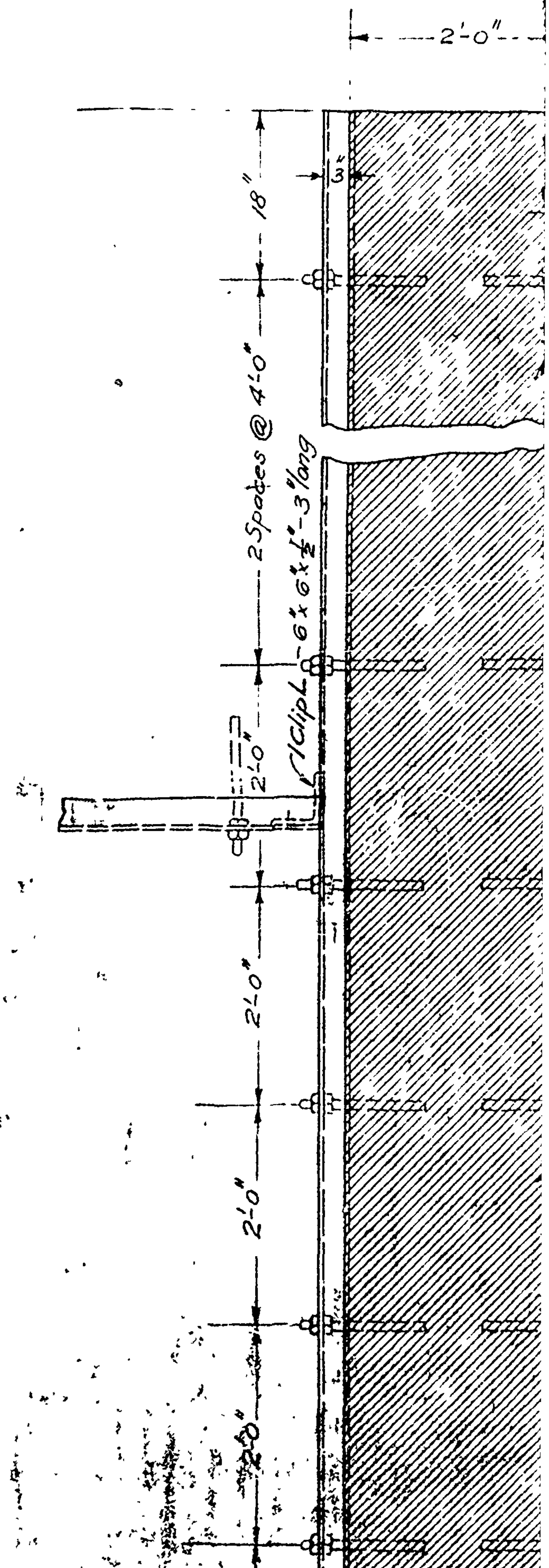
Examined and approved

March 4, 1913

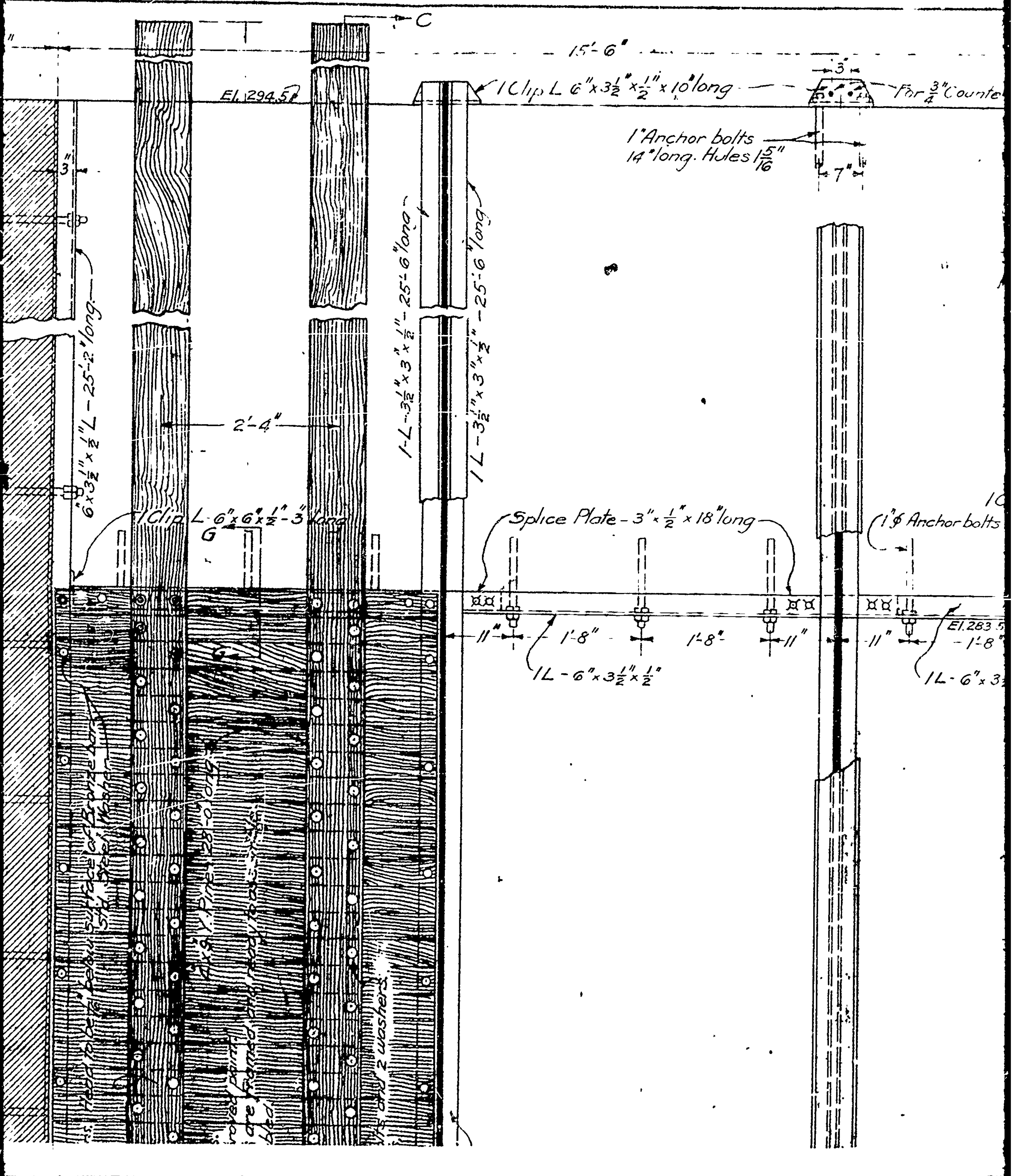
Alex. C. Baird

Special Deputy State Engineer

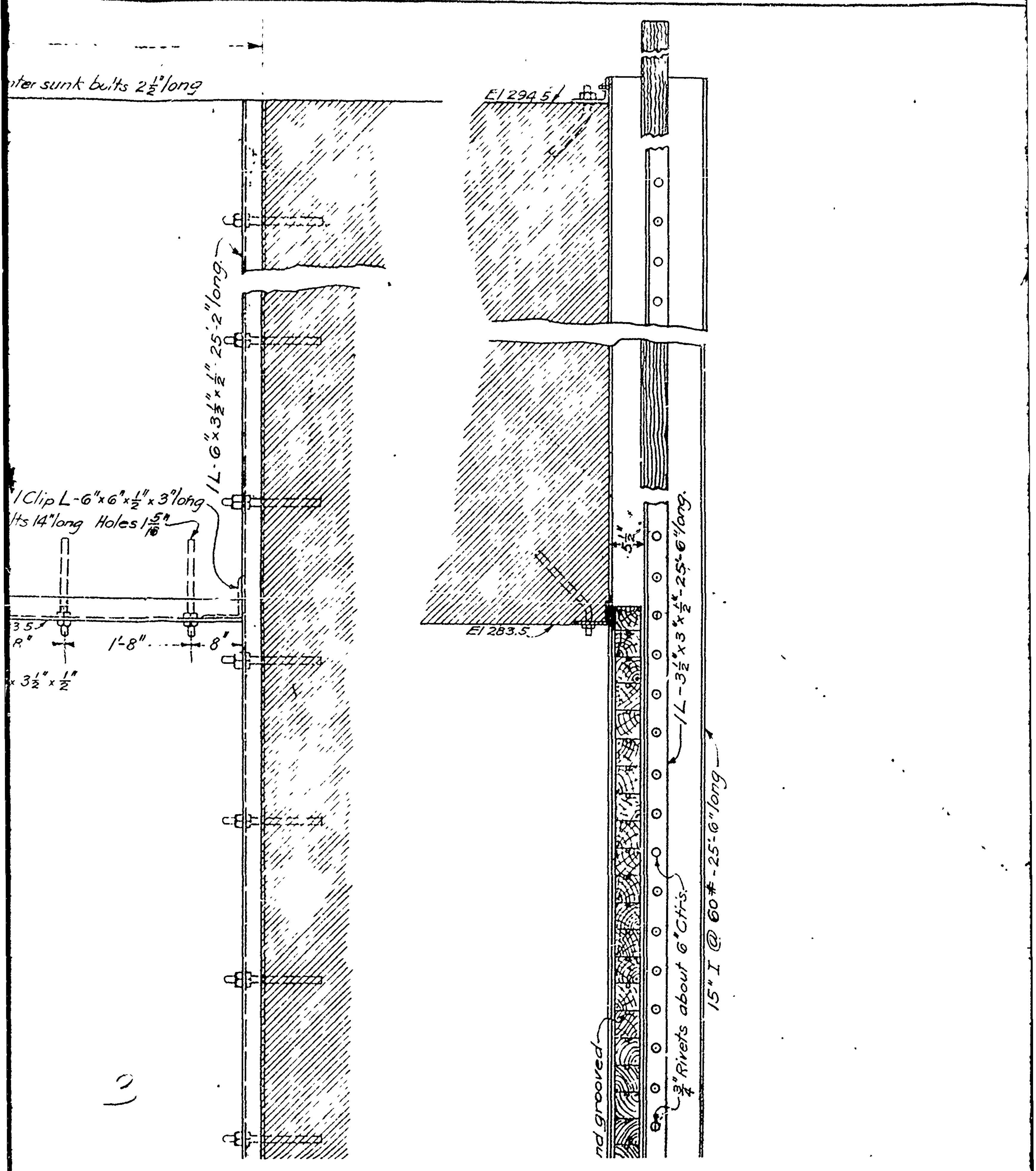
8

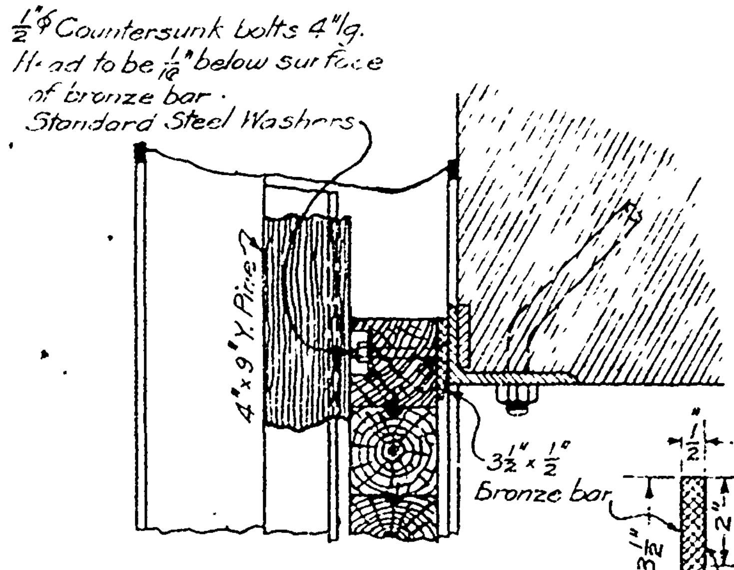


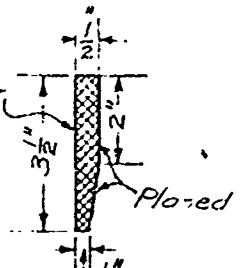
2'-0"
3"
18"
2 Spaces @ 4'-0"
1 Clip L - 6"x6"x½"-3" long
2'-0"
2'-0"
2'-0"
2'-0"



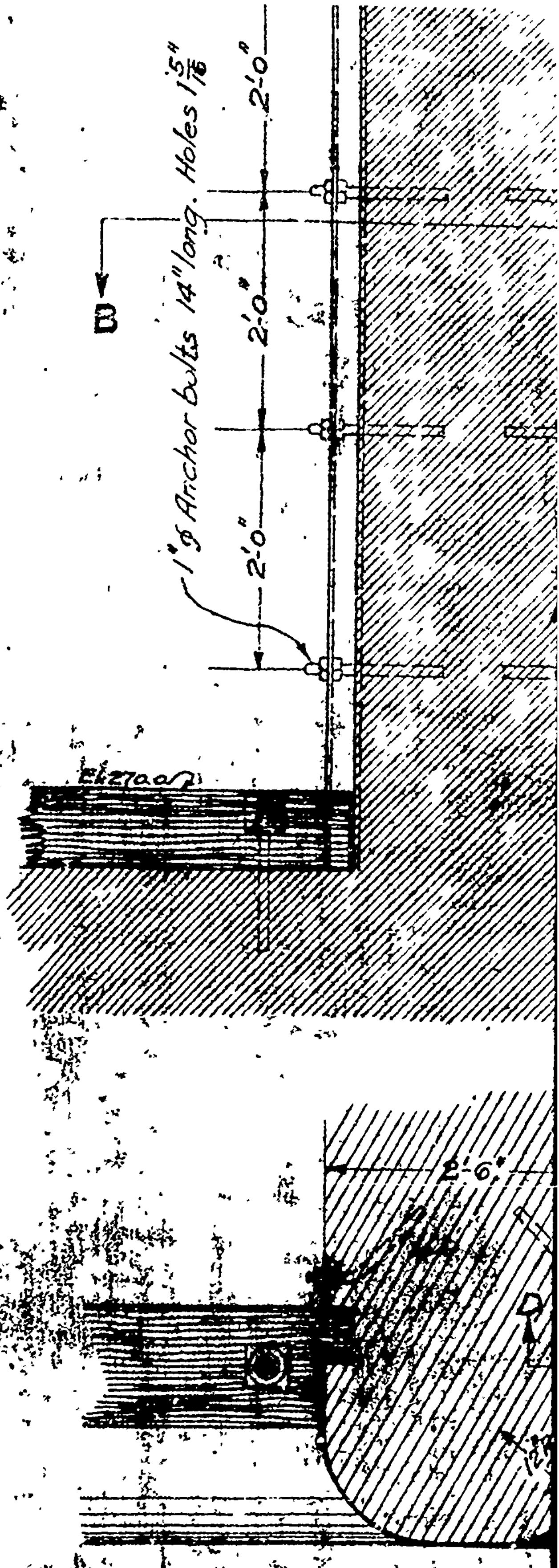
C
15'-6"
El. 294.5
1 Clip L 6"x3½"x½"x10"long
3"
For ¾" Counte
1" Anchor bolts
14" long. Holes 1 5/16"
7"
1-L-3½"x3"x½"-25'-6"long
1 L-3½"x3"x½"-25'-6"long
2'-4"
6"x3½"x½"L-25'-2"long
1 Clip L-6"x6"x½"-3"long
G
Splice Plate-3"x½"x18"long
1"φ Anchor bolts
11"
1'-8"
1'-8"
11"
11"
1'-8"
1L-6"x3½"x½"
El. 283.5
1L-6"x3
2 washers


nter sunk bolts 2½" long
El 294.5
1 L-6"x3½"x½" 25'-2" long
1 Clip L-6"x6"x½"x3" long
lts 14" long Holes 1 5/16"
35
R"
1'-8"
8"
x 3½" x ½"
El 283.5
5½"
1 L-3½"x3"x½"-25'-6" long
¾" Rivets about 6" Ctrs.
15" I @ 60# -25'-6" long
nd grooved

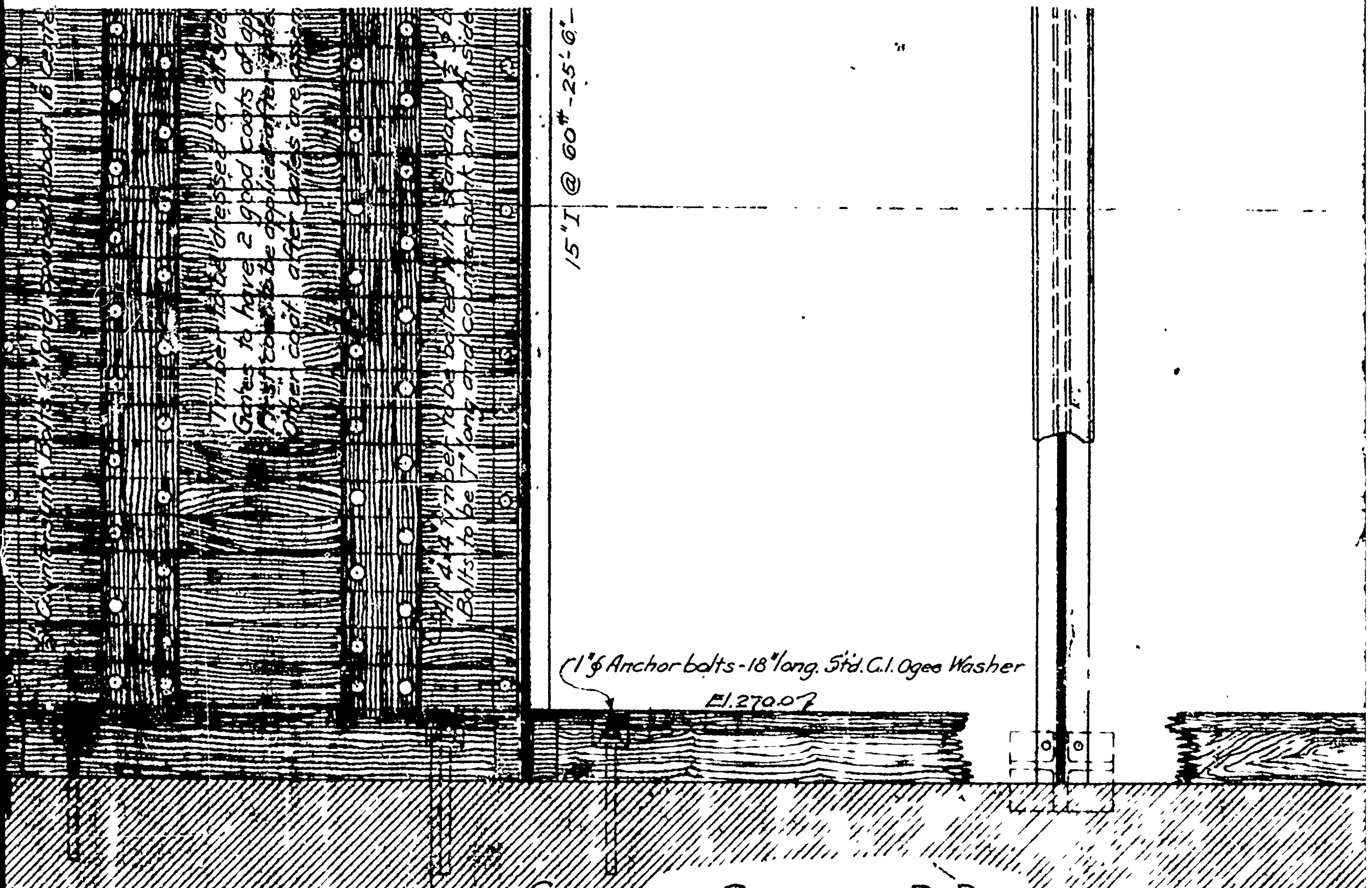




· DETAIL AT "G"-G ·
Scale 1 1/2" = 1'-0"

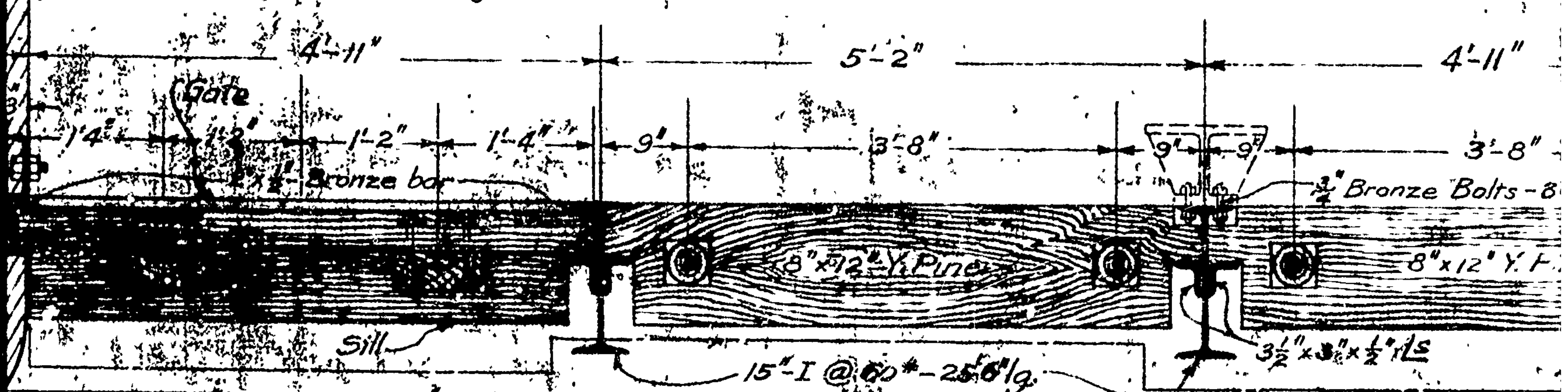


MADE BY J. M. Prior
TRACED BY Cosgrave
1ST CHECK BY J.H. Stevens June '12
2ND CHECK BY J. M. Prior



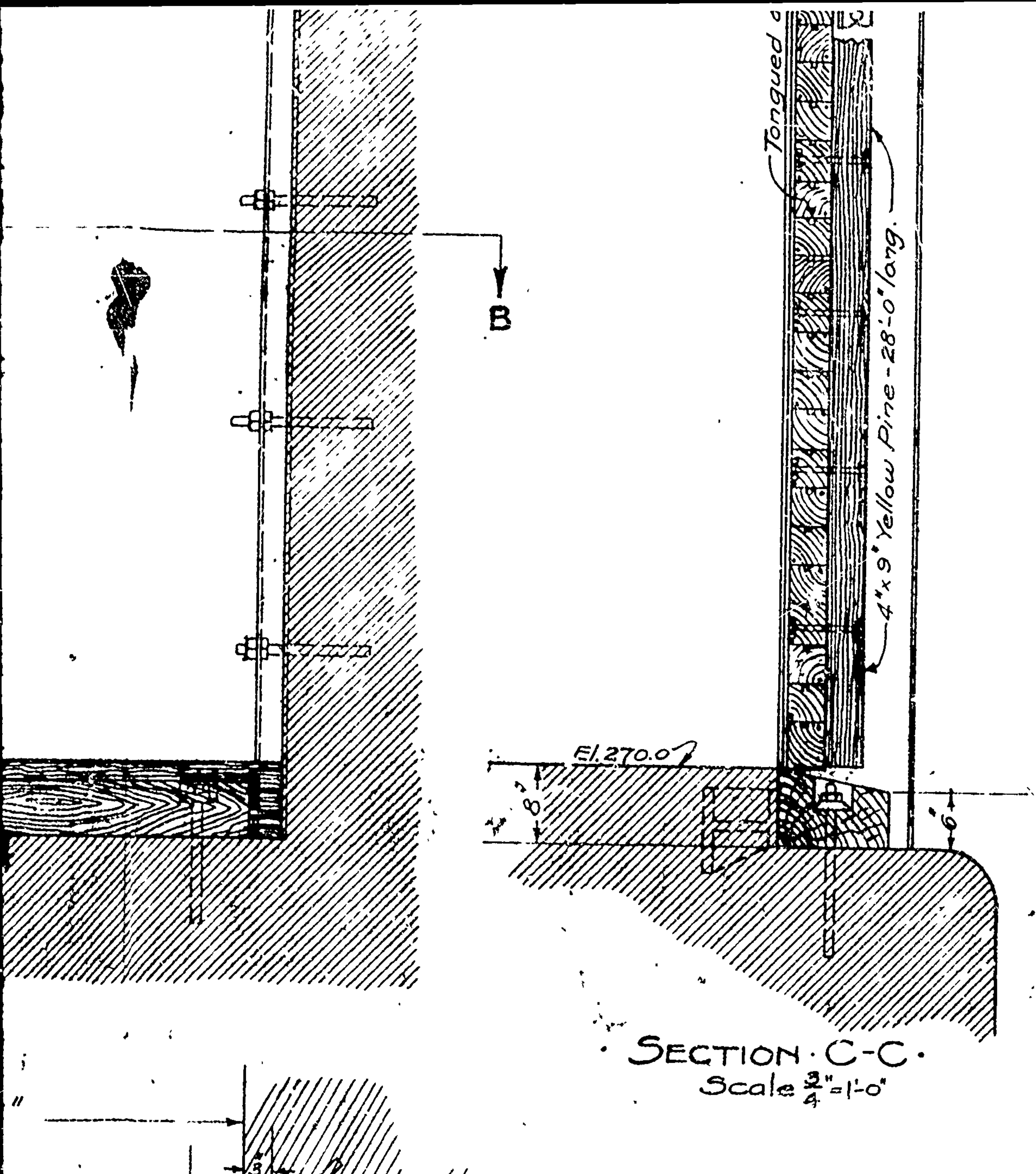
SECTION D-D
Scale: 3/4" = 1'-0"

Position of stems may be changed to conform to dimensions of gate hoists.



SECTION B-B
Scale: 3/4" = 1'-0"

6



Contrac

Champlain Canal

Glens Fa

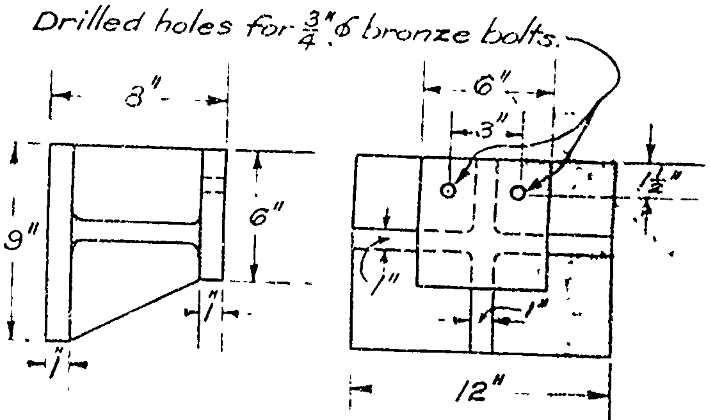
DETAILS OF GATES

Scales a

Examined and approved

July 1 1912

Supervising Engineer



CAST IRON BEARING
Scale: 1½"-1'-0"

trac Contract No. 56.

anal amplain Canal **Section 2**

ens Fa Glens Falls Feeder.

ATES ILS OF GATES, SOUTH BULKHEAD

cales a Scales as indicated

approved

ly 1 1912

ng Engineer

Examined and approved

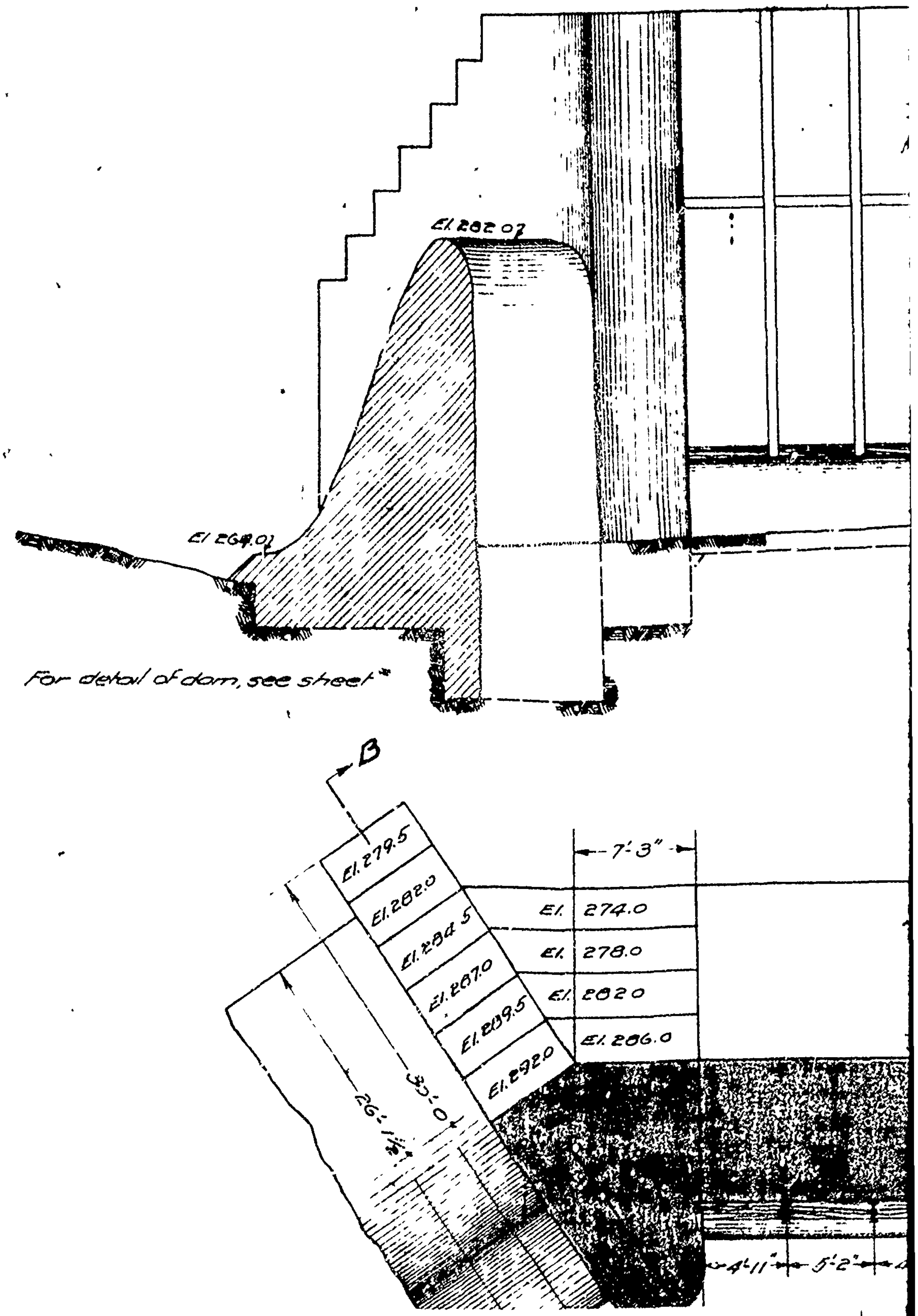
July 8, 1912

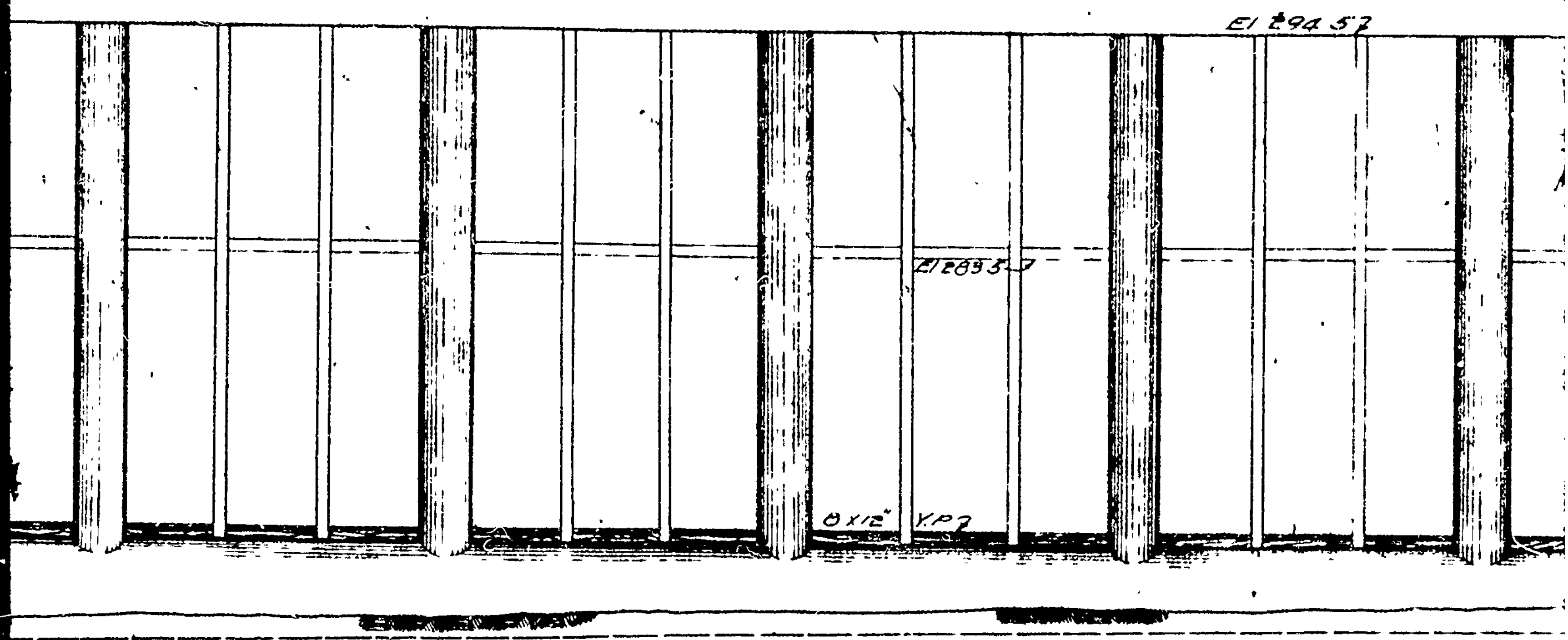
Alex. E. Kneil

Special Deputy State Engineer

8

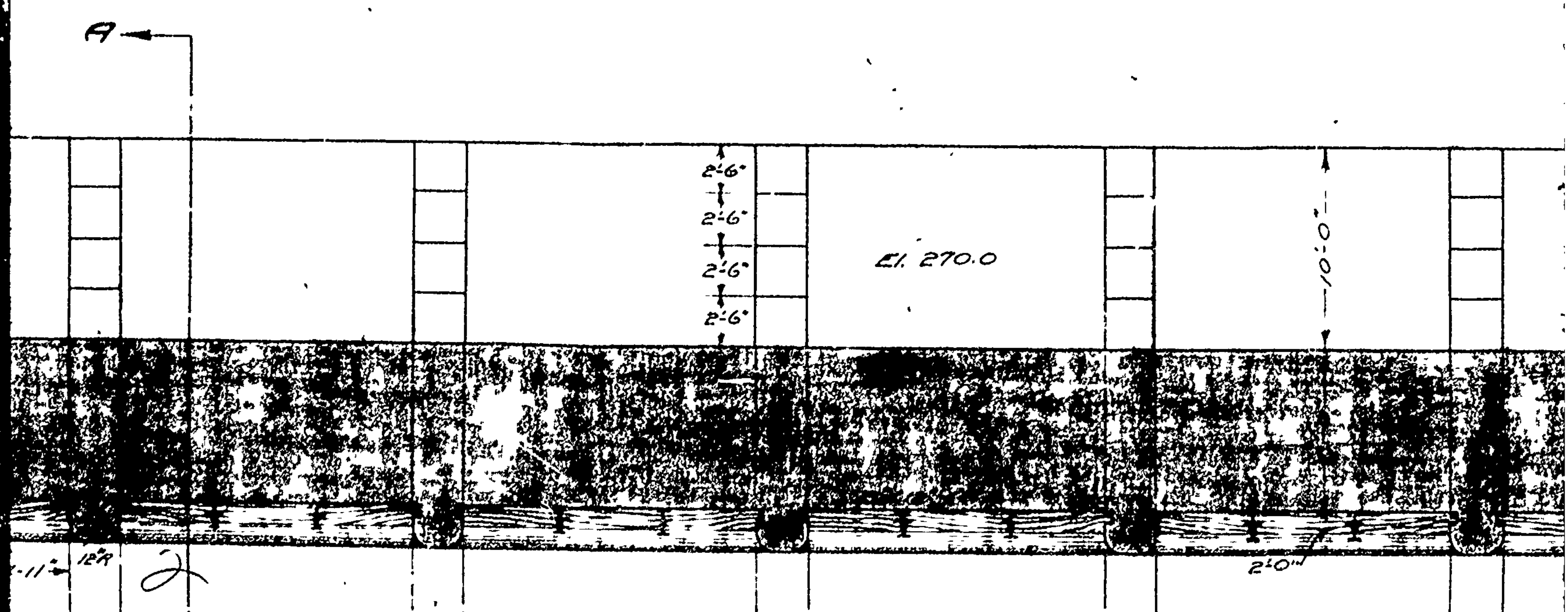
53

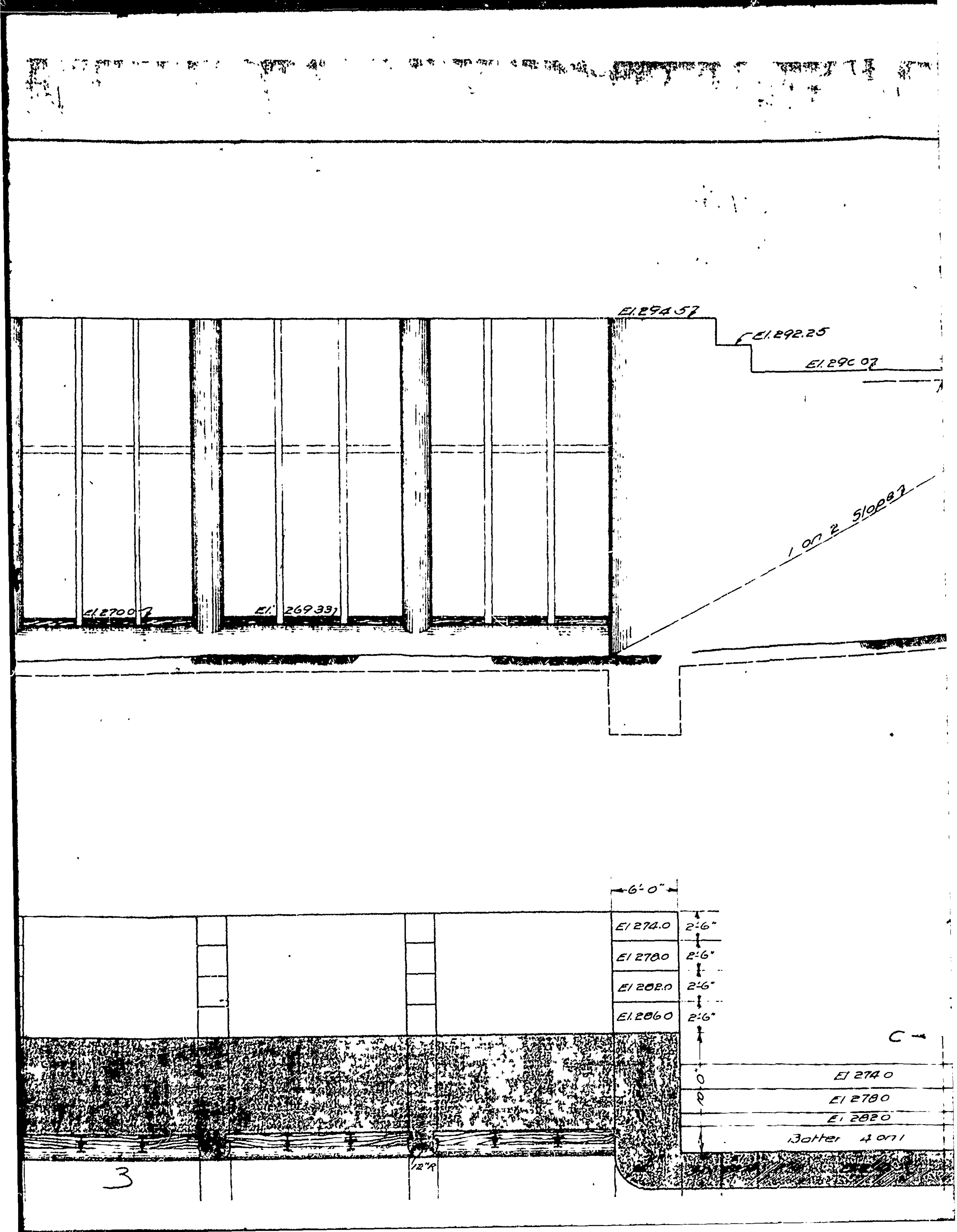

El. 282.0
El 264.0
For detail of dam, see sheet
B
El. 279.5
El. 282.0
El. 284.5
El. 287.0
El. 289.5
El. 292.0
7'-3"
El. 274.0
El. 278.0
El. 282.0
El. 286.0
30'-0"
26'-1½"
4'-11"
5'-2"



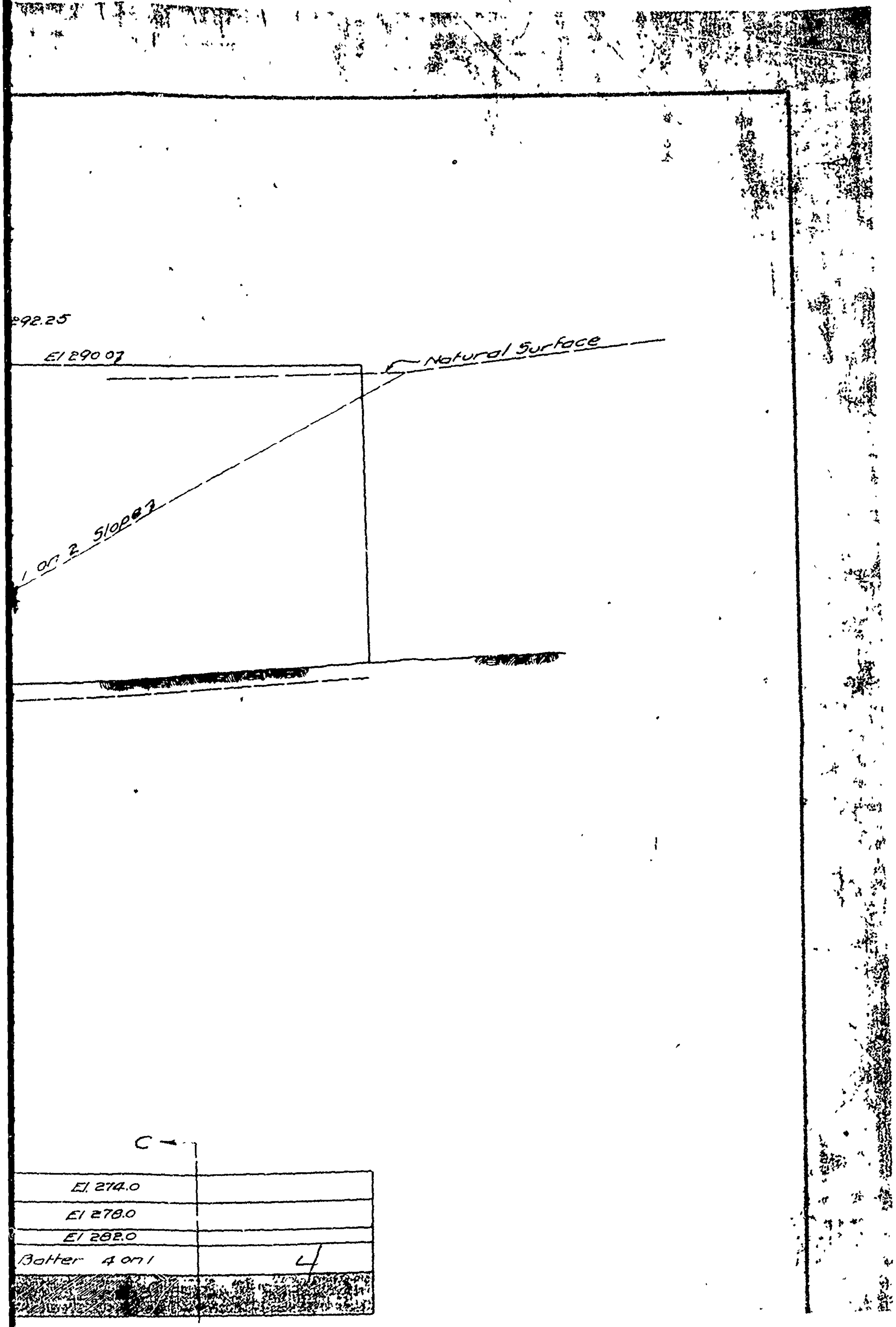
UP-STREAM ELEVATION

Scale 1/8" = 1'-0"

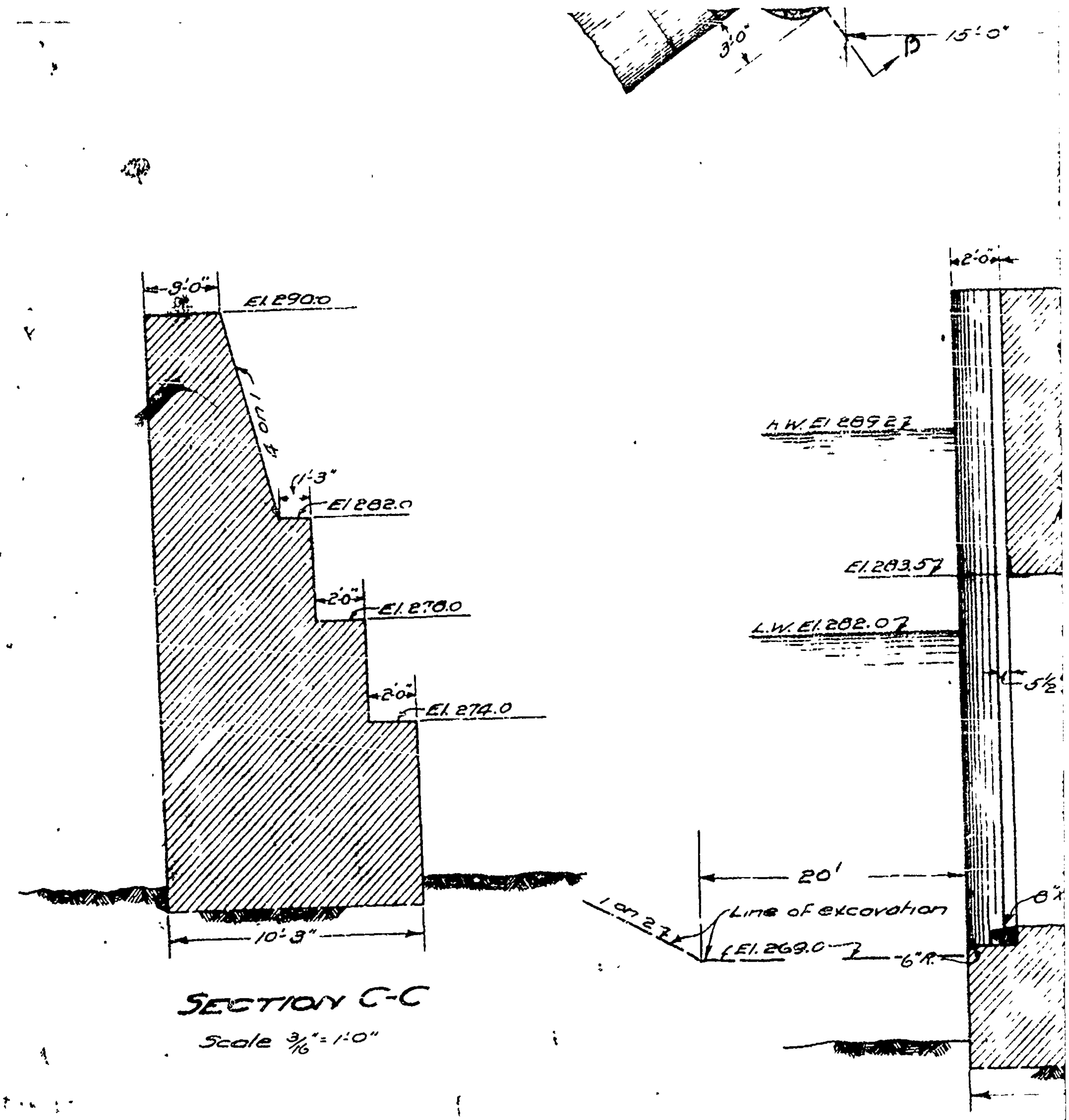




El. 294.57
El. 292.25
1 on 2 Slope
El. 270.0
El. 269.33
6'-0"
El 274.0
El 278.0
El 282.0
El. 286.0
2'-6"
2'-6"
2'-6"
2'-6"
C
El 274.0
El 278.0
El 282.0
Batter 4 on 1
12"R
3



292.25
El 290.0
Natural Surface
1 on 2 Slope
C
El. 274.0
El 278.0
El 282.0
Batter 4 on 1
4



SECTION C-C

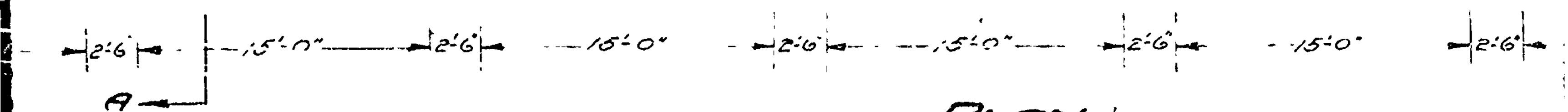
Scale 3/16" = 1'-0"

Made By H W Benedict

Traced By S.T. [illegible]

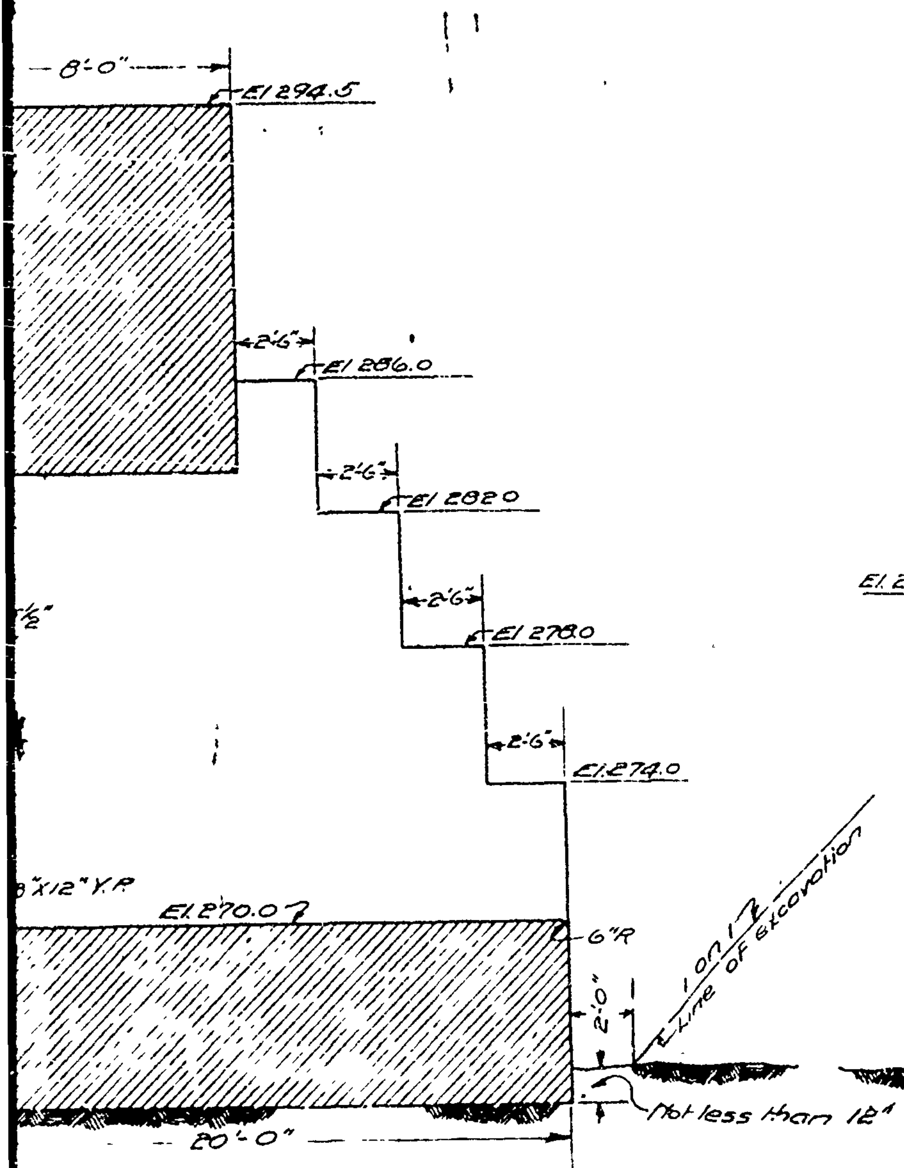
Checked By H. J. Spiers June 1912

End Check By [illegible]



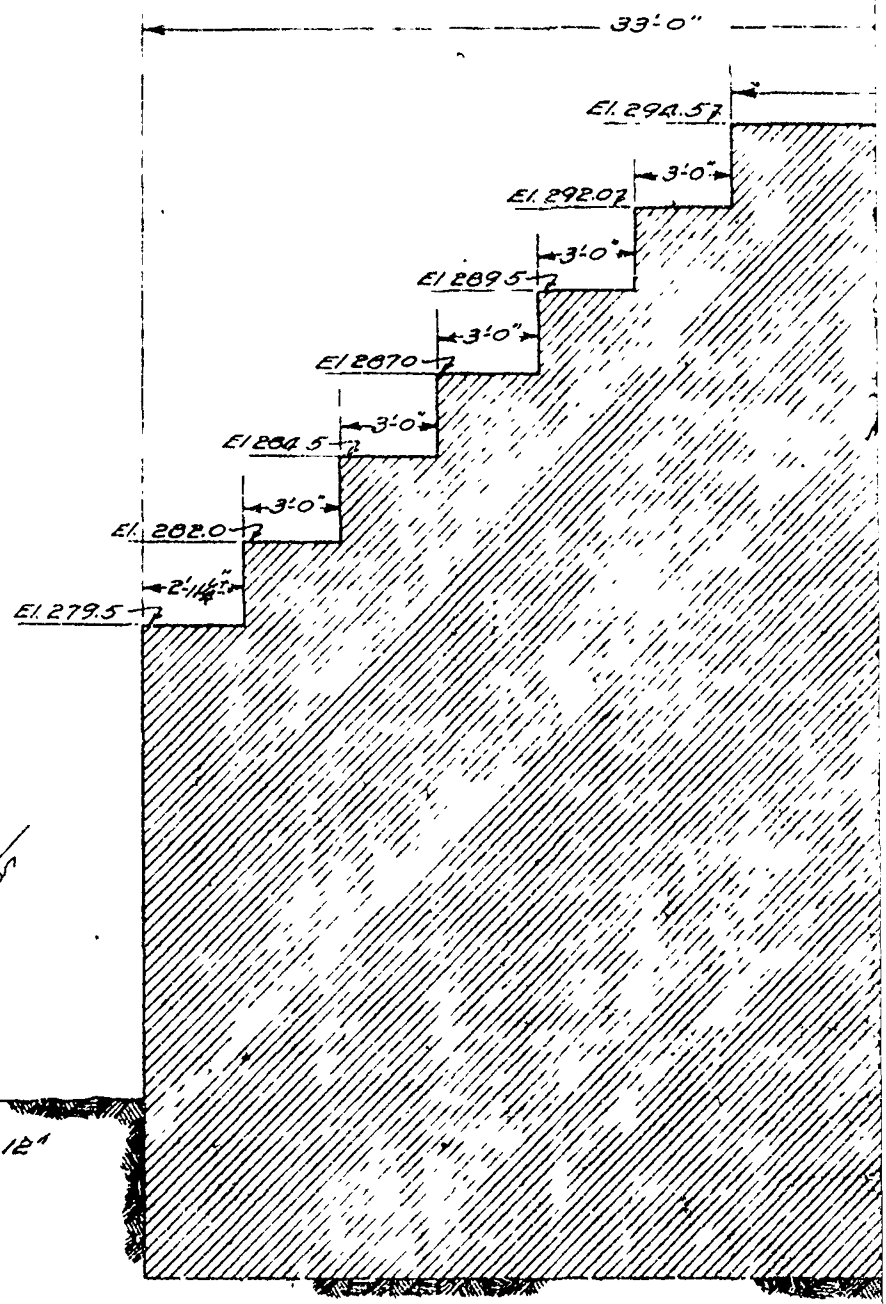
PLAN

Scale 1/8"-1'-0"



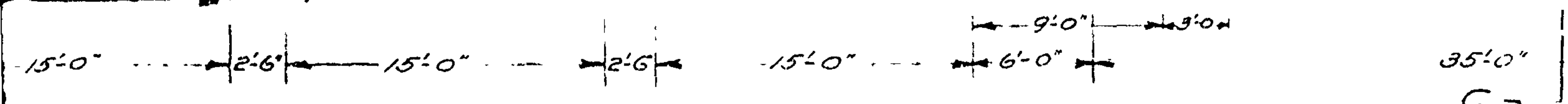
SECTION A-A

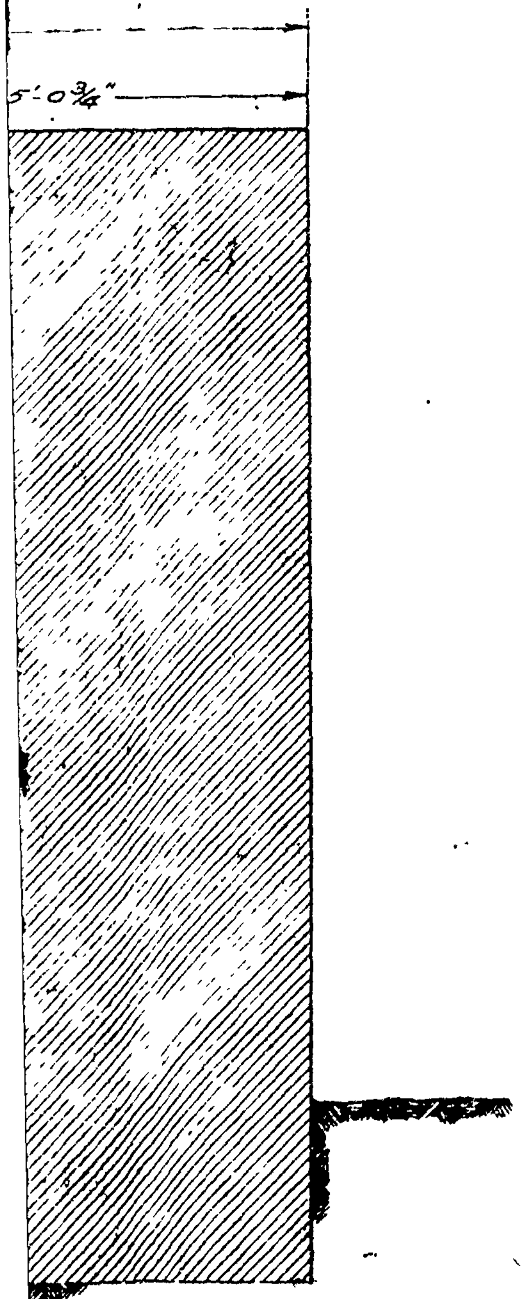
Scale 3/16"=1'-0"



SECTION B-B

Scale 3/16"=1'-0"





NOTES:

All masonry shown on this sheet k...
unless otherwise shown.

All exposed edges of concrete to be ...
two inches unless otherwise sh...

The bases of structures on any of the...
shall be considered as approxima...
ordered by the State Engineer ...
elevation and of any dimension ...
proper foundation.

For detail of Head Gates, see sheet ...

For layout plan, see sheet No 49

Contract

Champlain Canal

Glens Fall...

DETAIL PLAN OF S...
GLENS FALLS ...

Scales as i...

Examined and approved

July 1 1912

G. F. Stickney

Supervising Engineer

35'0"
C →

ry shown on this sheet to be 2nd Class Concrete
s otherwise shown.
d edges of concrete to be rounded to a radius of
ches unless otherwise shown
of structures on any of the plans of this contract
be considered as approximate only, and may be
ed by the State Engineer in writing to be at any
ion and of any dimension necessary to give a
r foundation.
l of Head Gates, see sheet No 53
plan, see sheet No 49

Contract No. 56.

hamplain Canal Section 2

Glens Falls Feeder.

ETAIL PLAN OF SOUTH BULKHEAD,
GLENS FALLS FEEDER DAM

Scales as indicated.

and approved

July 1 1912

G. F. Stickney

vising Engineer

Examined and approved

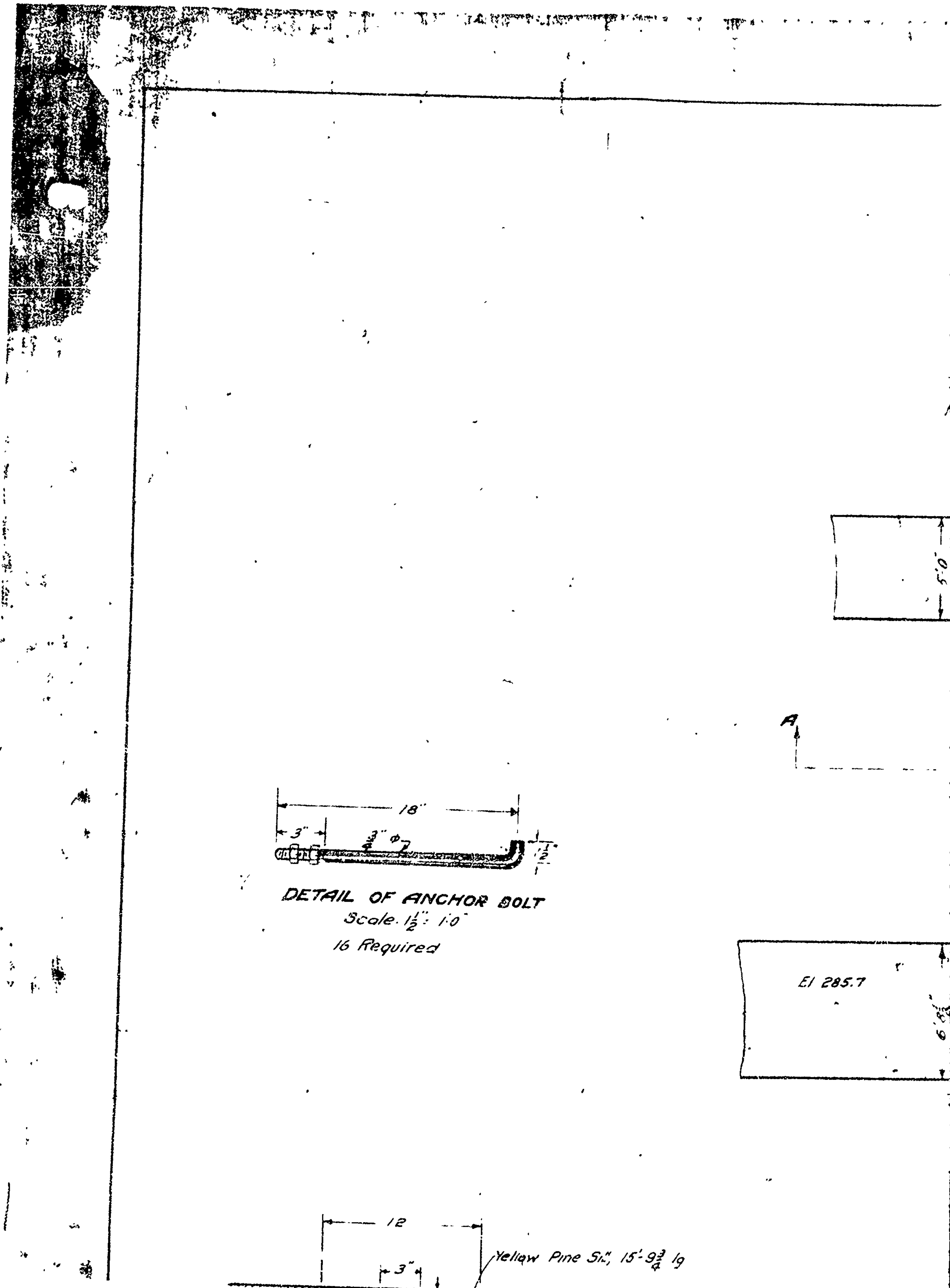
July 1 1912

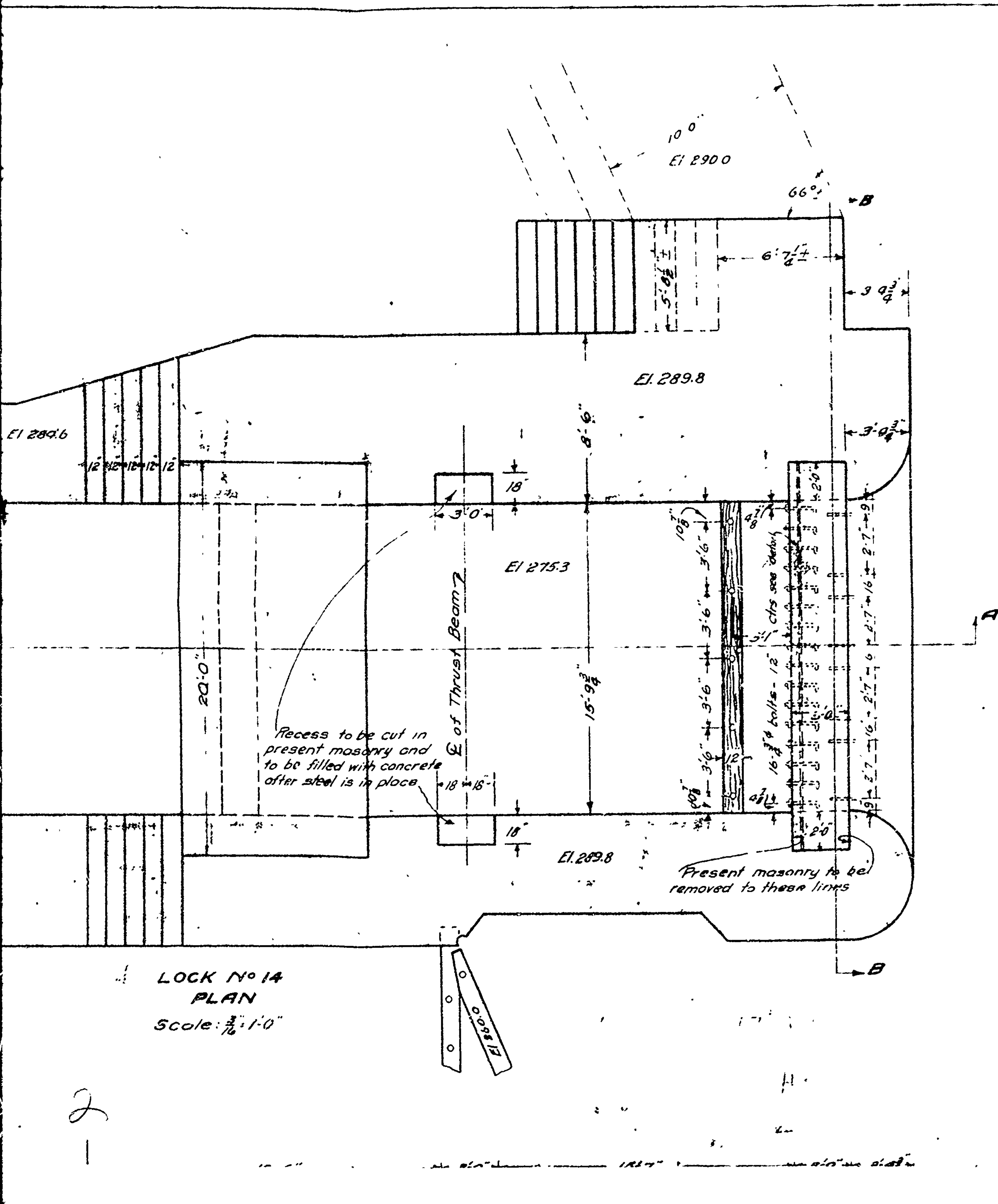
Alvin C. Knight

Special Deputy State Engineer

8

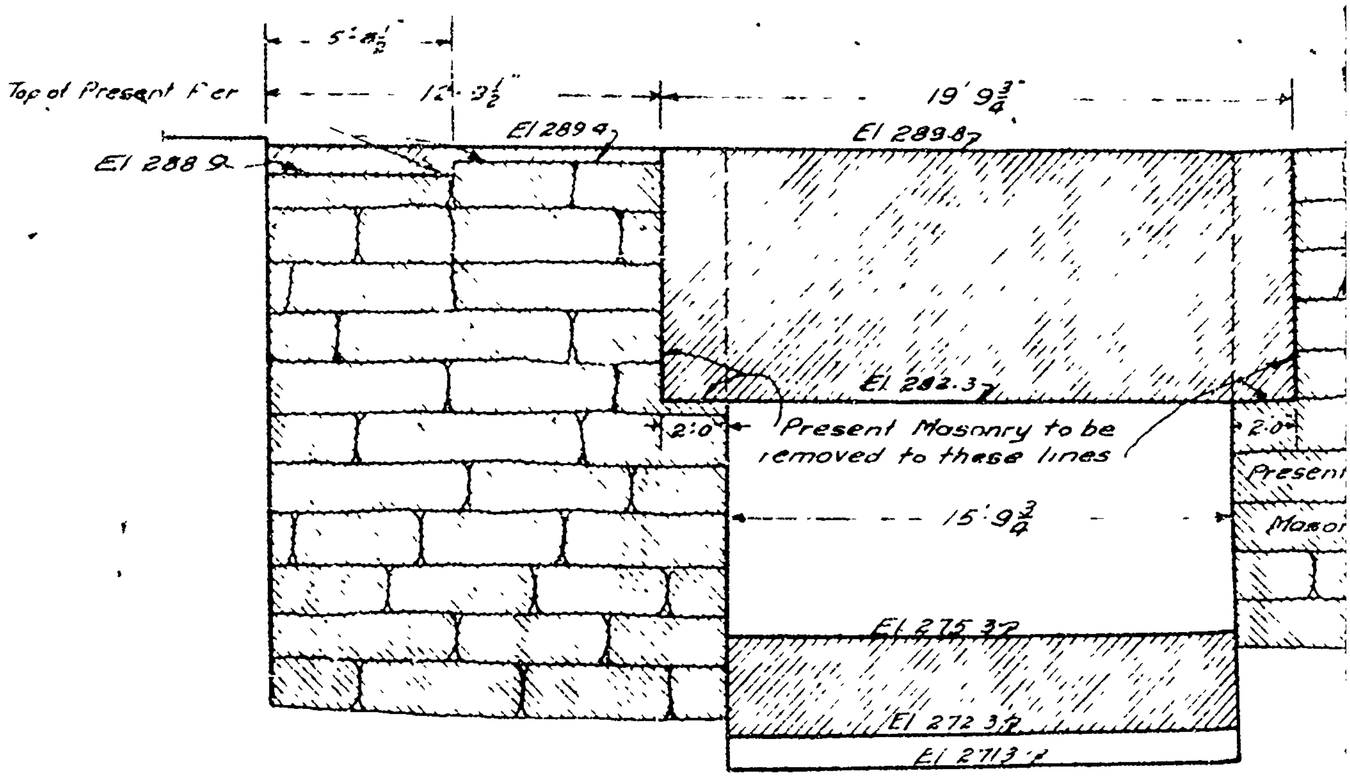
52


5'-0"
A
18"
3"
3/4" φ
1/2
DETAIL OF ANCHOR BOLT
Scale. 1 1/2" : 1'-0"
16 Required
El 285.7
6'-8"
12
3"
Yellow Pine Sill, 15'-9 3/4 lg

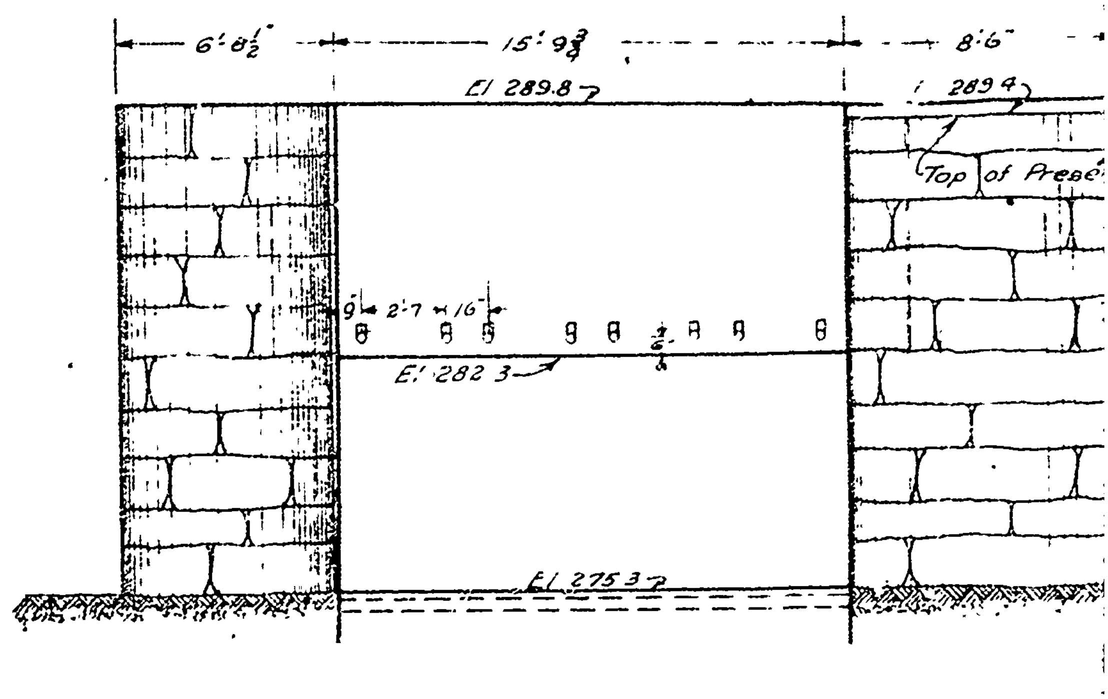


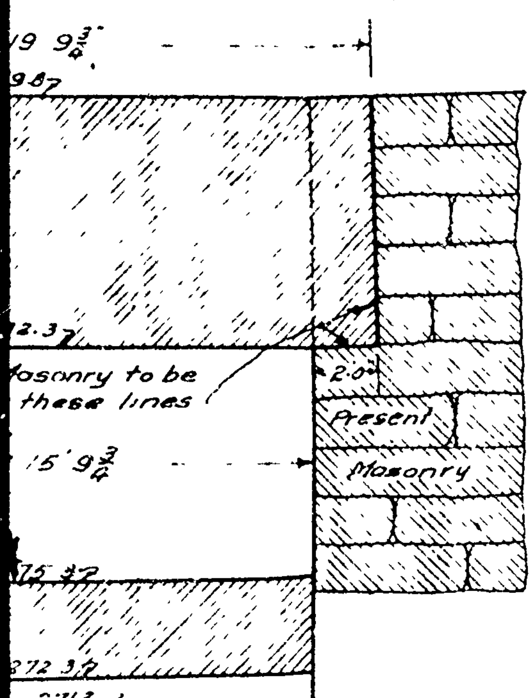
LOCK No 14
PLAN
Scale: 3/16" = 1'-0"

2



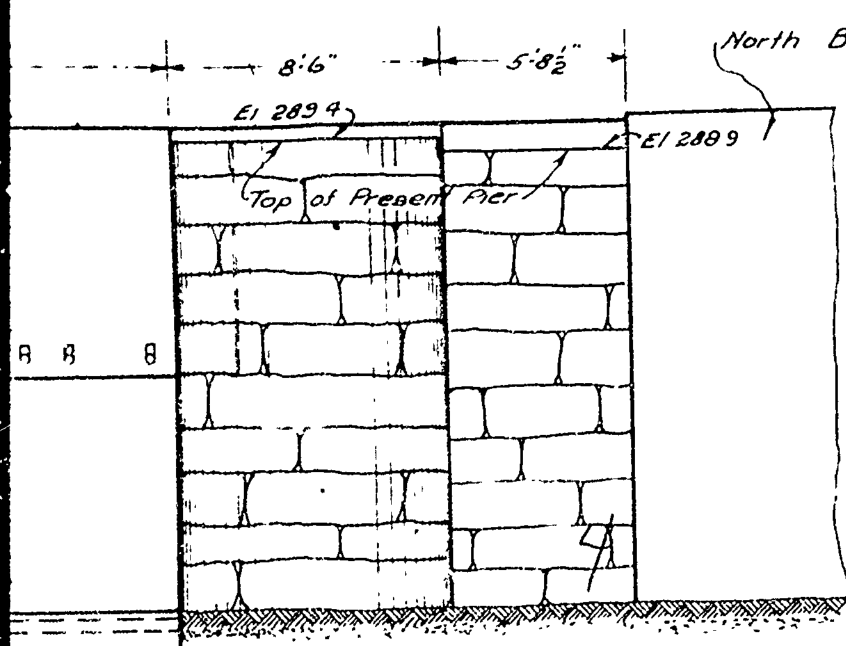
SECTION B-B
Scale: $\frac{3}{16}$" = 1'-0"

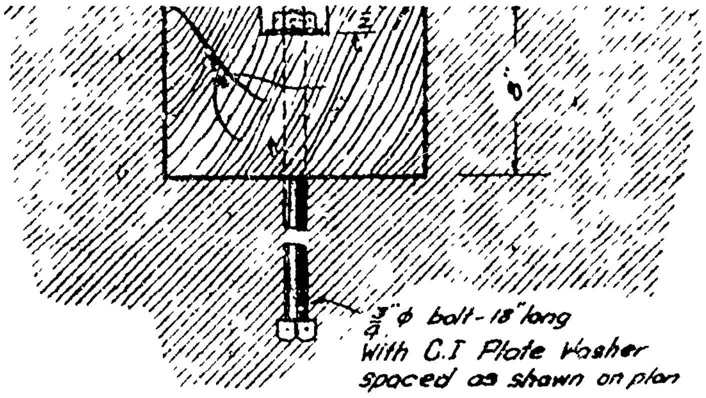




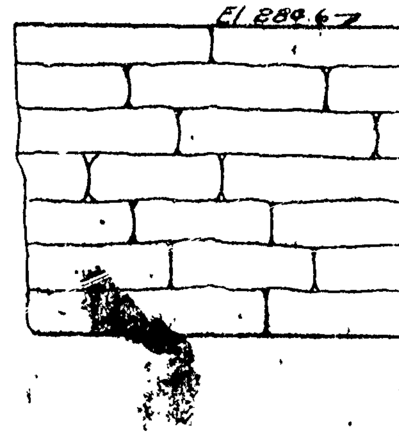
ION B-B

$\frac{3}{16}$: 1'-0"

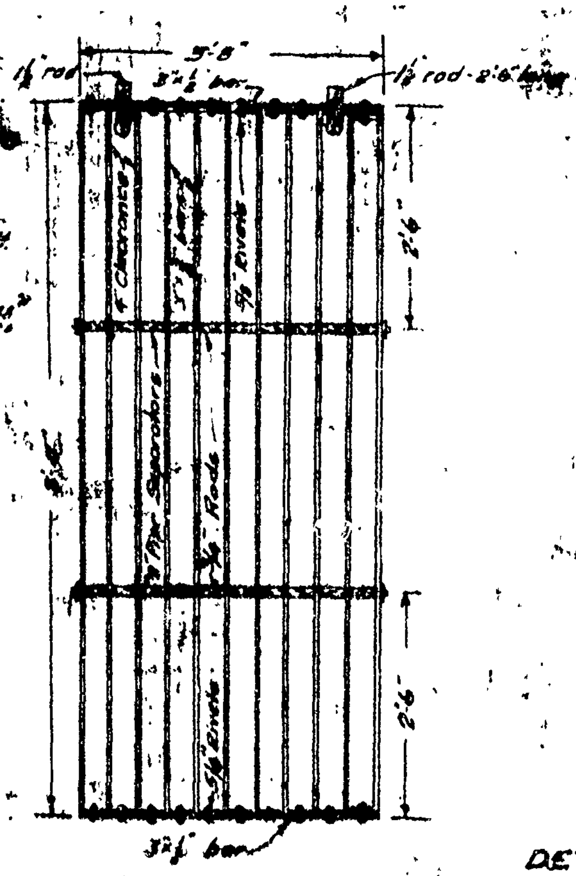




DETAIL OF SILL.
Scale: $1\frac{1}{2}$" = 1'-0".



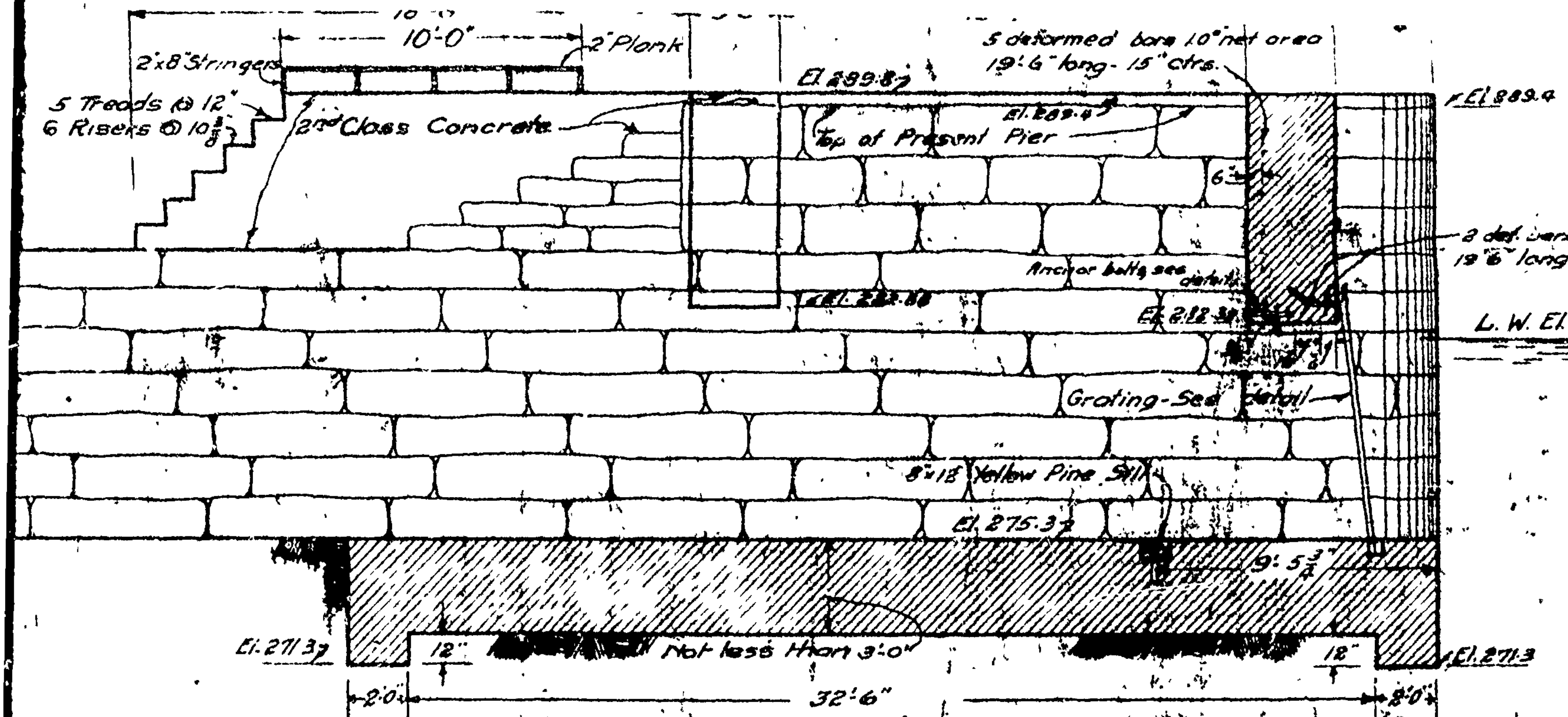
BILL OF MATERIAL FOR 1 GRATING
11 bars 3" x ⅜" - 8'-8" long @ 3.83" per lin. ft.
2 bars 3" x ½" - 3'-8" long @ 5.1" per lin. ft.
20 - 2" W.I. Pipe Separators 4" long @ 3.51" per lin. ft.
2 - 1½" rods - 2'-6" long @ 6.0" per lin. ft.
2 - ⅝" rods - 3'-10 long @ 1.5" per lin. ft. Add 0.38" for nuts
20 - ⅝" rivets @ 25.5" per 100



DETAIL
Sc

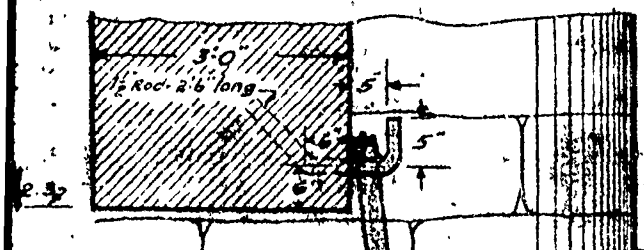
Made By J. M. Prum
Checked By J. H. Atkinson 5-15-12
Traced By R. C. Murray
2nd Check By

5



SECTION A-A

Scale: $\frac{3}{16}$" = 1'-0"



OF GRATING

...le: $\frac{1}{2}$" = 1'-0"

...quired

NOTES:- All masonry shown on this sheet ...

All exposed edges of concrete ... otherwise shown.

Metal reinforcement to be deform...

The size and spacing of bars m... Section of steel remains unchang...

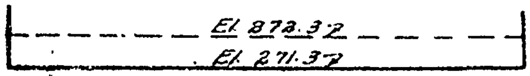
For location plan see sheet No. ...

All concrete in beam to be sec...

For details of gate see sheets ...

The bases of structures show... considered as approximate and ... writing tabe at any elevation and ... foundation.

6



FRONT ELEVATION
Scale: 3/16" = 1'0"

bars 1.0" net area
ong.

El 288.07

...st to be second class concrete except as noted.
...ete to be rounded to a radius of two inches unless

...formed bars of minimum cross section given.
...s may be changed slightly provided the total net
...hanged."
N° 13
...second class concrete - classed as Reinforced Concrete.
...ts 58-59-60
...shown on any of the plans of this contract, shall be
...only, and may be ordered by the State Engineer in
...and of any dimensions necessary to give a proper

Contra...

Champlain Cana...

Glens ...

DETAILS OF ...

Scales

Examined and approved
July ...
G. F. Stickney
... Engineer

tra Contract No. 56.

Cana Champlain Canal Section 2

Glens Glens Falls Feeder.

S OF DETAILS OF BY-PASS, LOCK 14

Scales Scales as indicated

and approved Examined and approved

July July

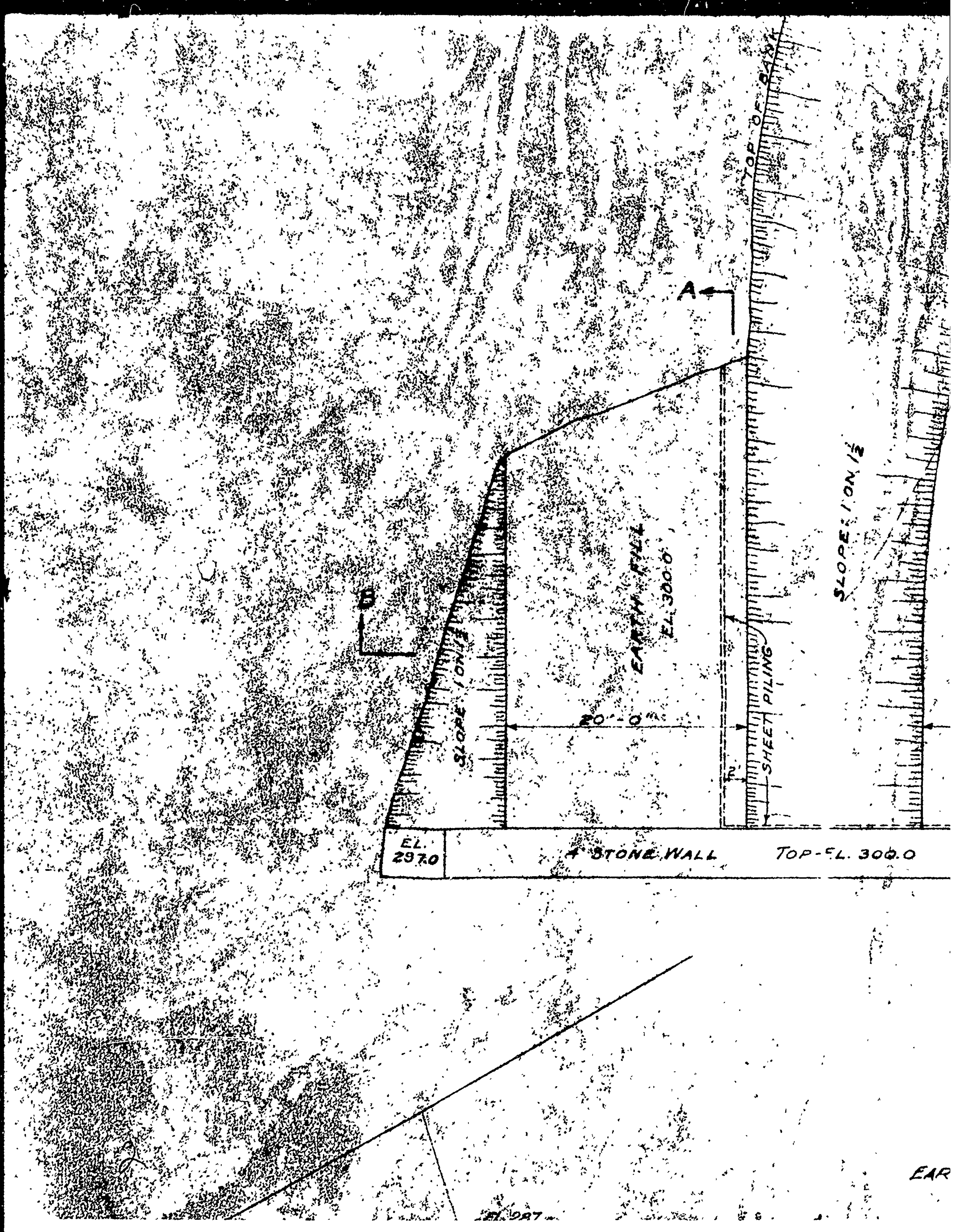
G. F. Stickney Alvy E. ...

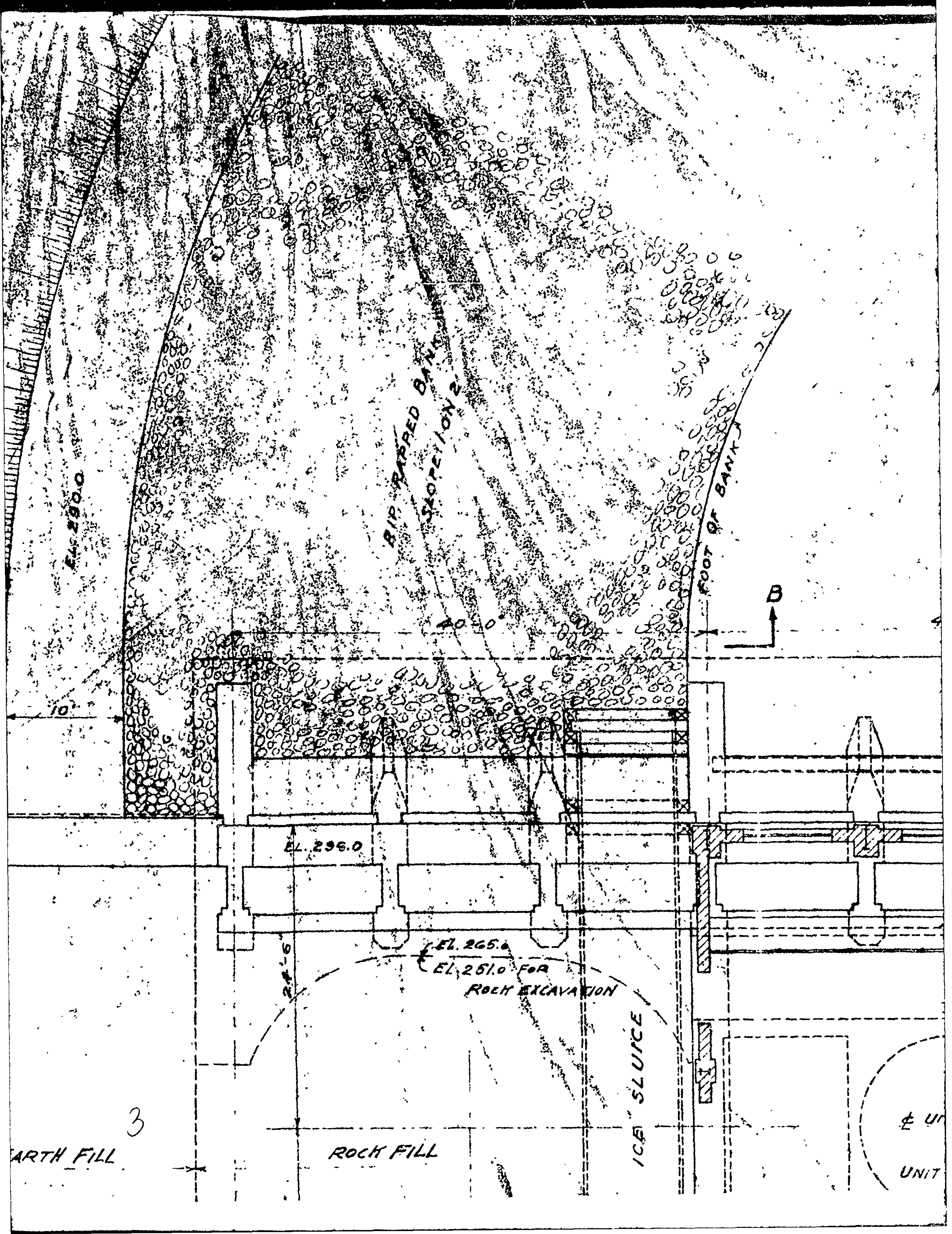
Engineer Special Deputy State Engineer

26

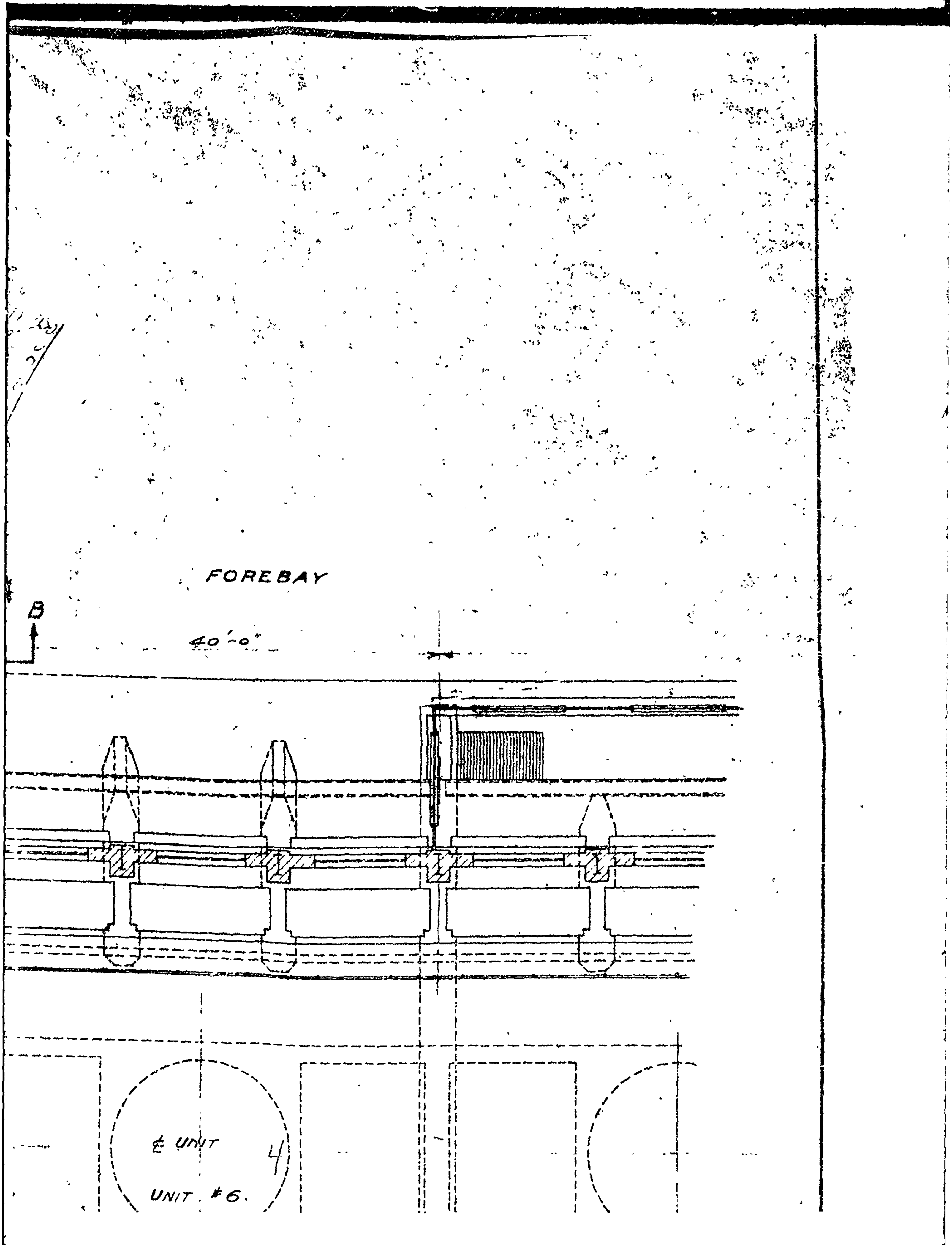
8

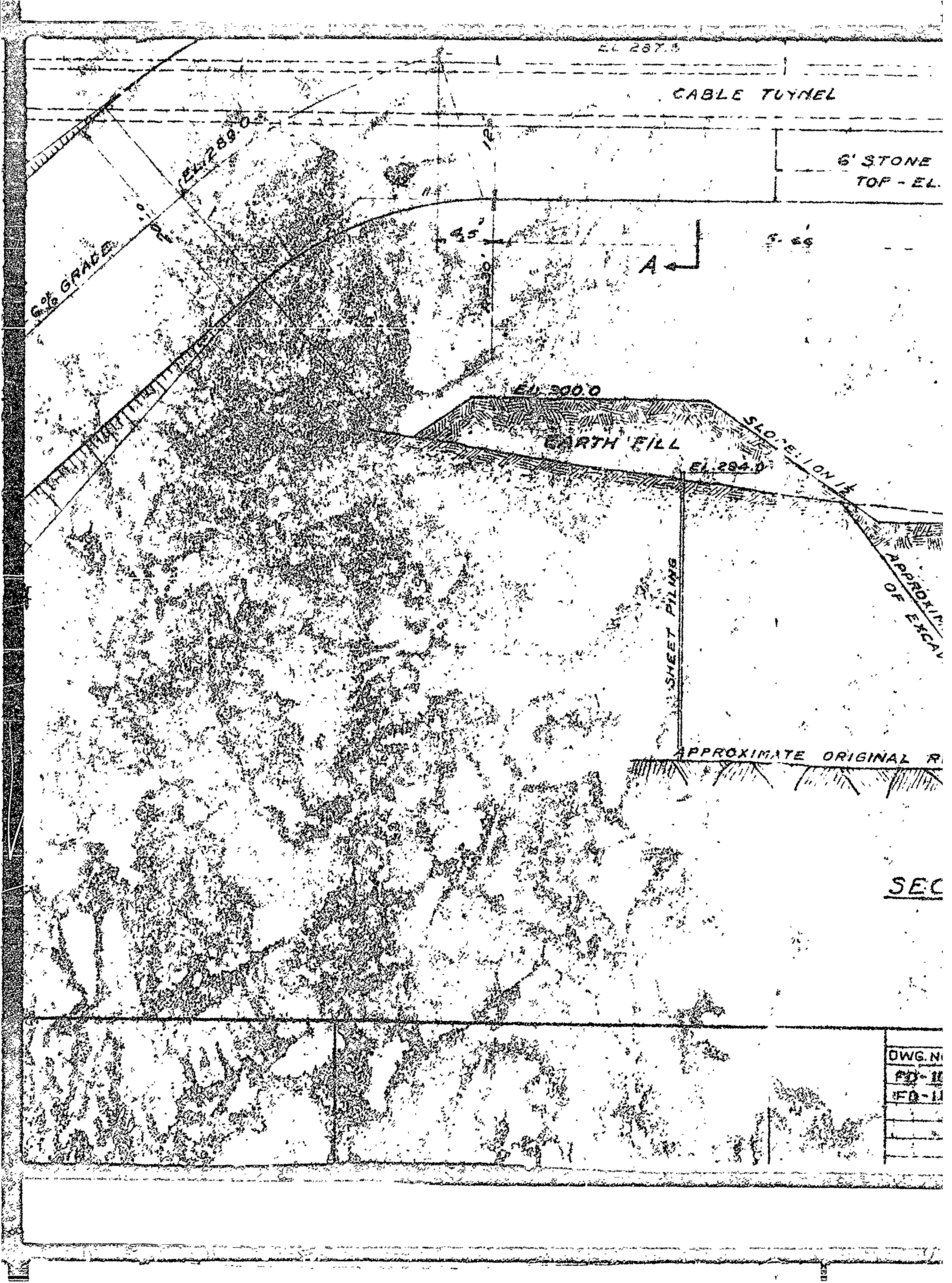
SECTION A-A.

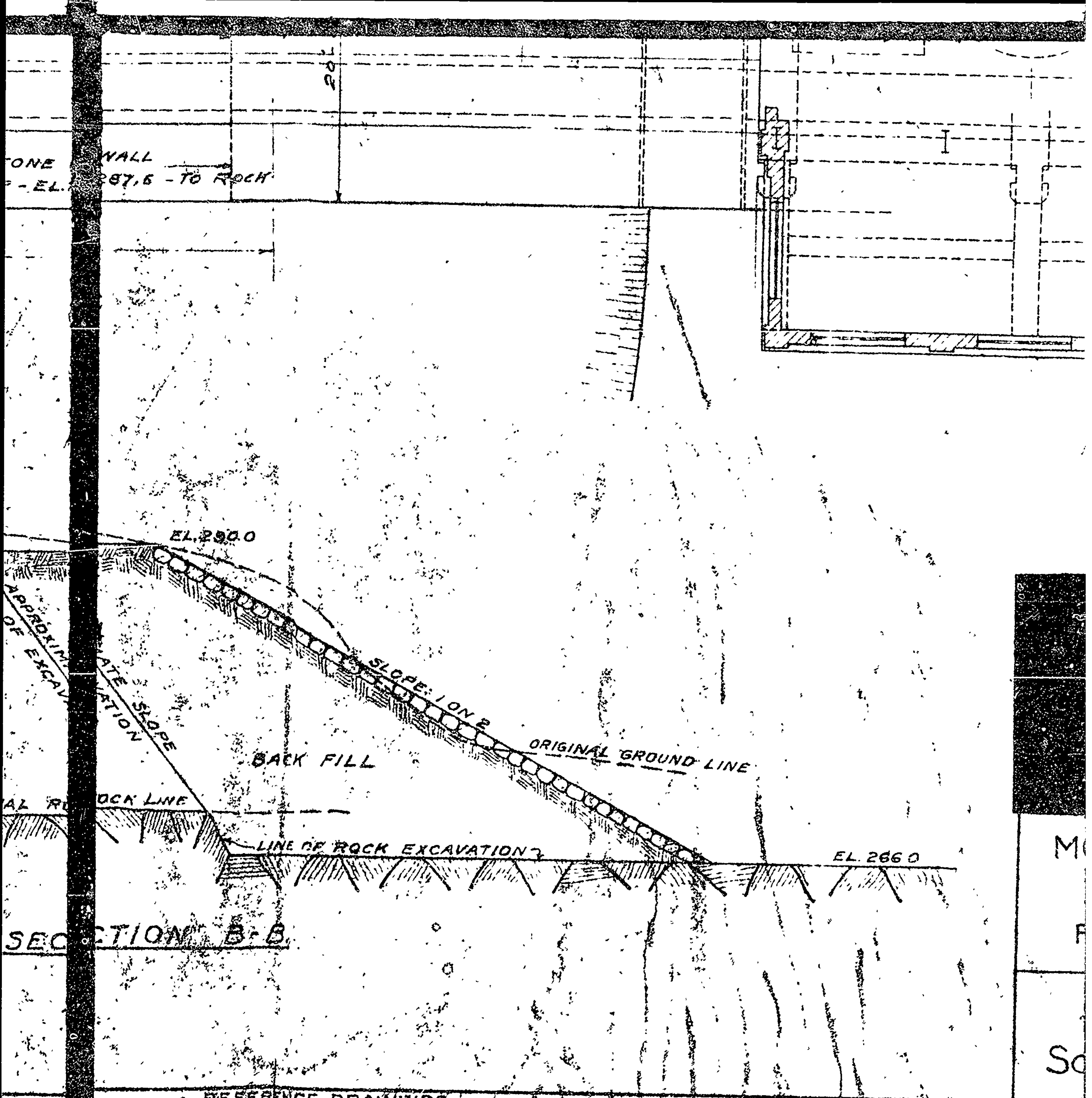

A
TOP OF BANK
SLOPE 1 ON 1½
EARTH FILL
EL. 300.0
20'-0"
SHEET PILING
SLOPE 1 ON 1½
EL.
297.0
4' STONE WALL
TOP-EL. 300.0
EAR



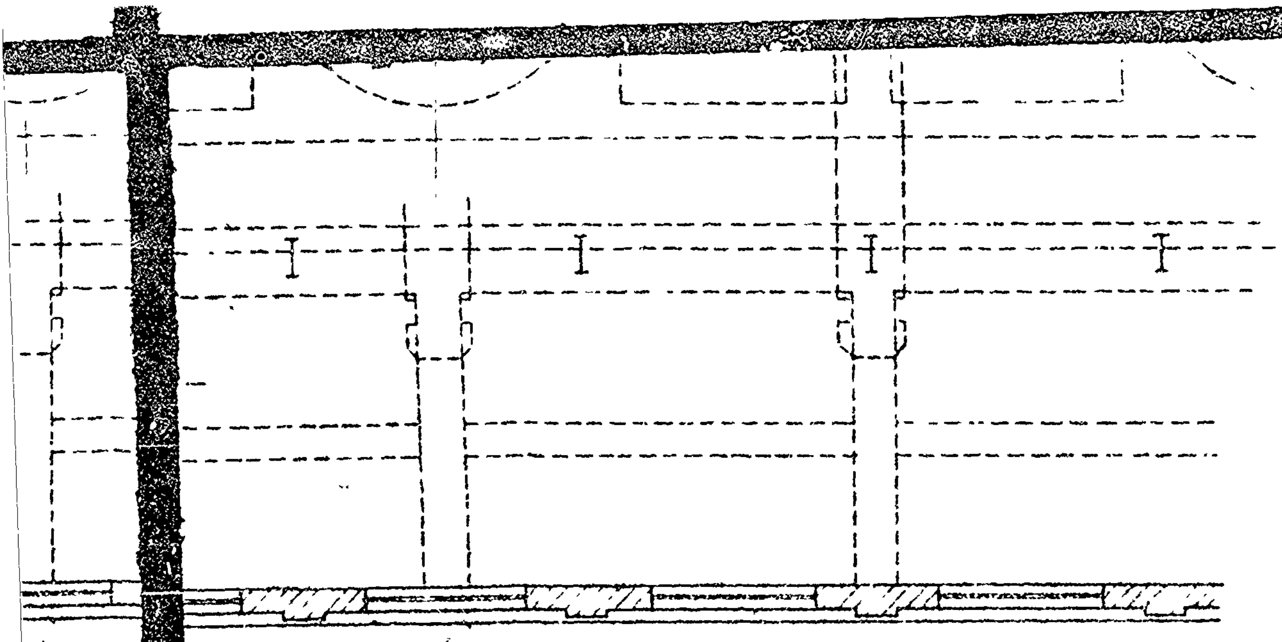
EL. 290.0
RIP RAPPED BANK
SLOPE 1 ON 2
FOOT OF BANK
B
40'-0"
10'
EL. 296.0
EL. 265.0
EL. 251.0 FOR
ROCK EXCAVATION
ICE SLUICE
3
EARTH FILL
ROCK FILL
UNIT


FOREBAY
B
40'-0"
℄ UNIT
4
UNIT #6.


EL. 287.5
CABLE TUNNEL
EL. 289.0
6% GRADE
6' STONE
TOP - EL.
A
EL. 300.0
EARTH FILL
EL. 294.0
SLOPE 1 ON 1½
SHEET PILING
APPROXIMATE ORIGINAL R
APPROXIM
OF EXCAV
SEC
DWG. N
FD-1
FD-1



TONE WALL
- EL. 287.6 - TO ROCK
EL. 290.0
APPROXIMATE SLOPE OF EXCAVATION
SLOPE: 1 ON 2
ORIGINAL GROUND LINE
BACK FILL
ROCK LINE
LINE OF ROCK EXCAVATION
EL. 266.0
SECTION B-B
REFERENCE DRAWINGS
DWG. NO.
TITLE
GENERAL PLAN AND SECTIONS OF POWER HOUSE
EXCAVATION PLAN
APPROVALS
CHIEF ENGINEER



MOREAU MANUFACTURING CO.

GLENS FALLS N.Y.

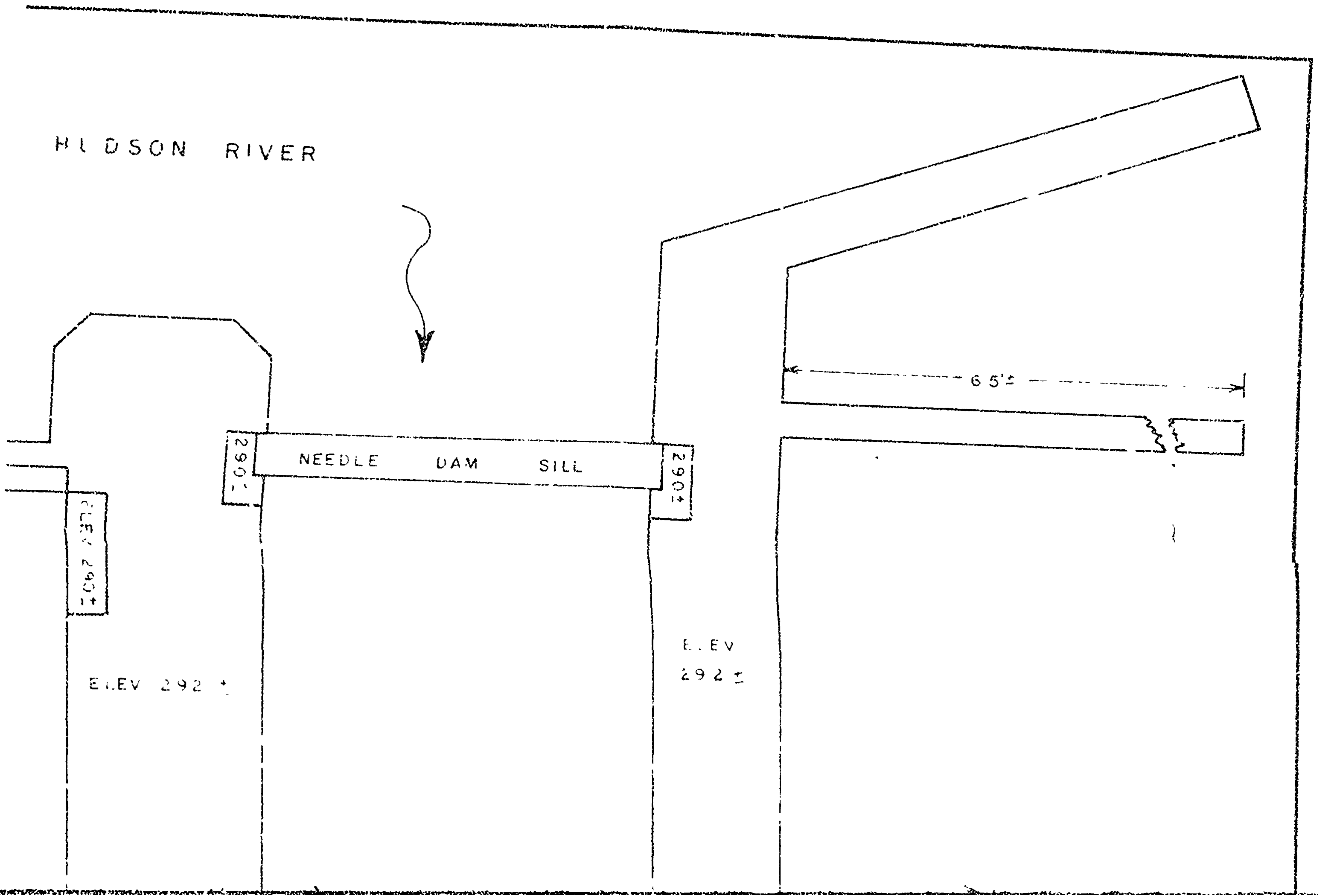
FEEDER DAM DEVELOPMENT.

PLAN AND SECTIONS AT SOUTH END OF POWER HOUSE.

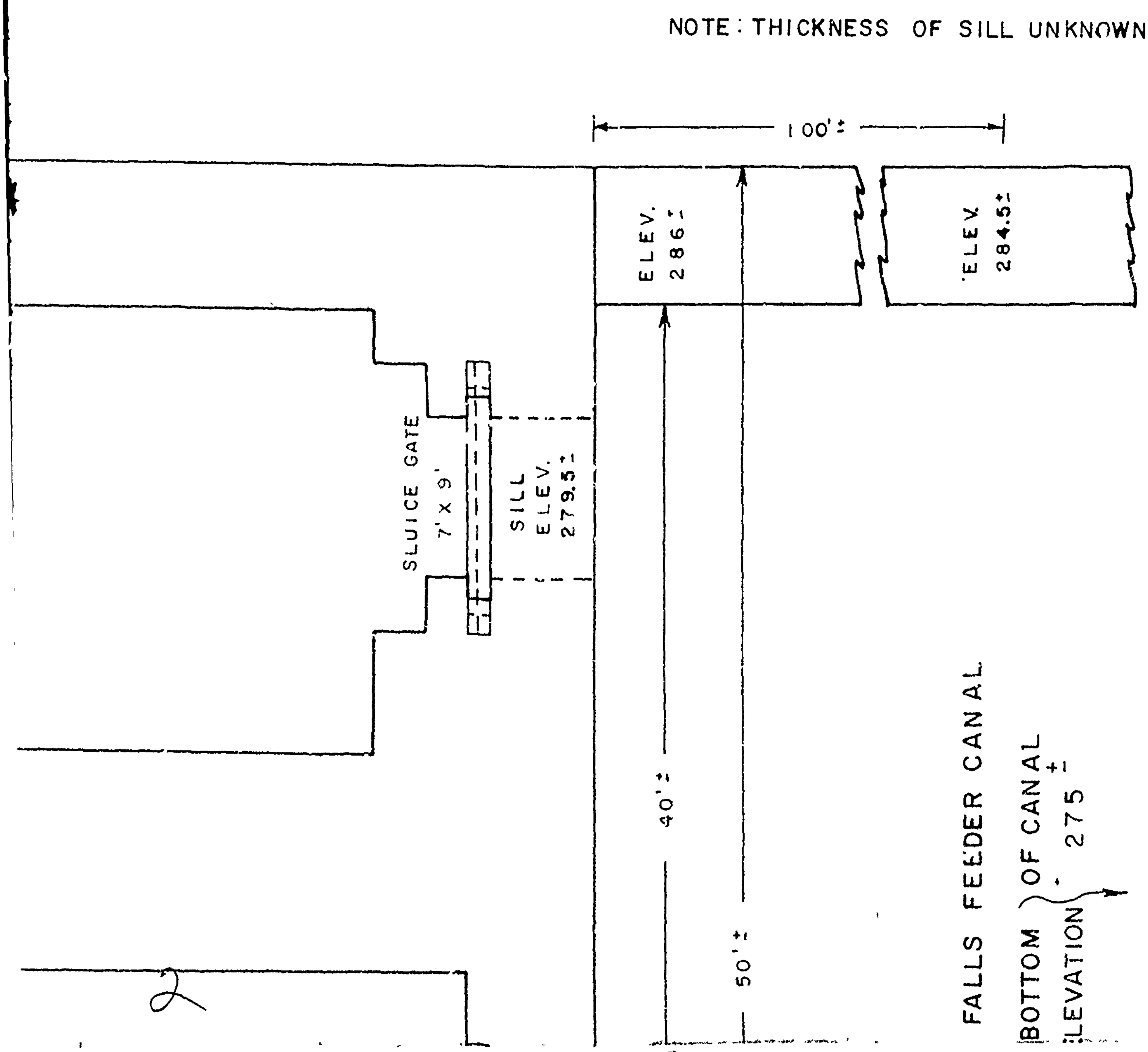
SCALE: 1/8" = 1'-0"   MADE BY: J J K.

CHECKED BY: DATE: July 17-1922.

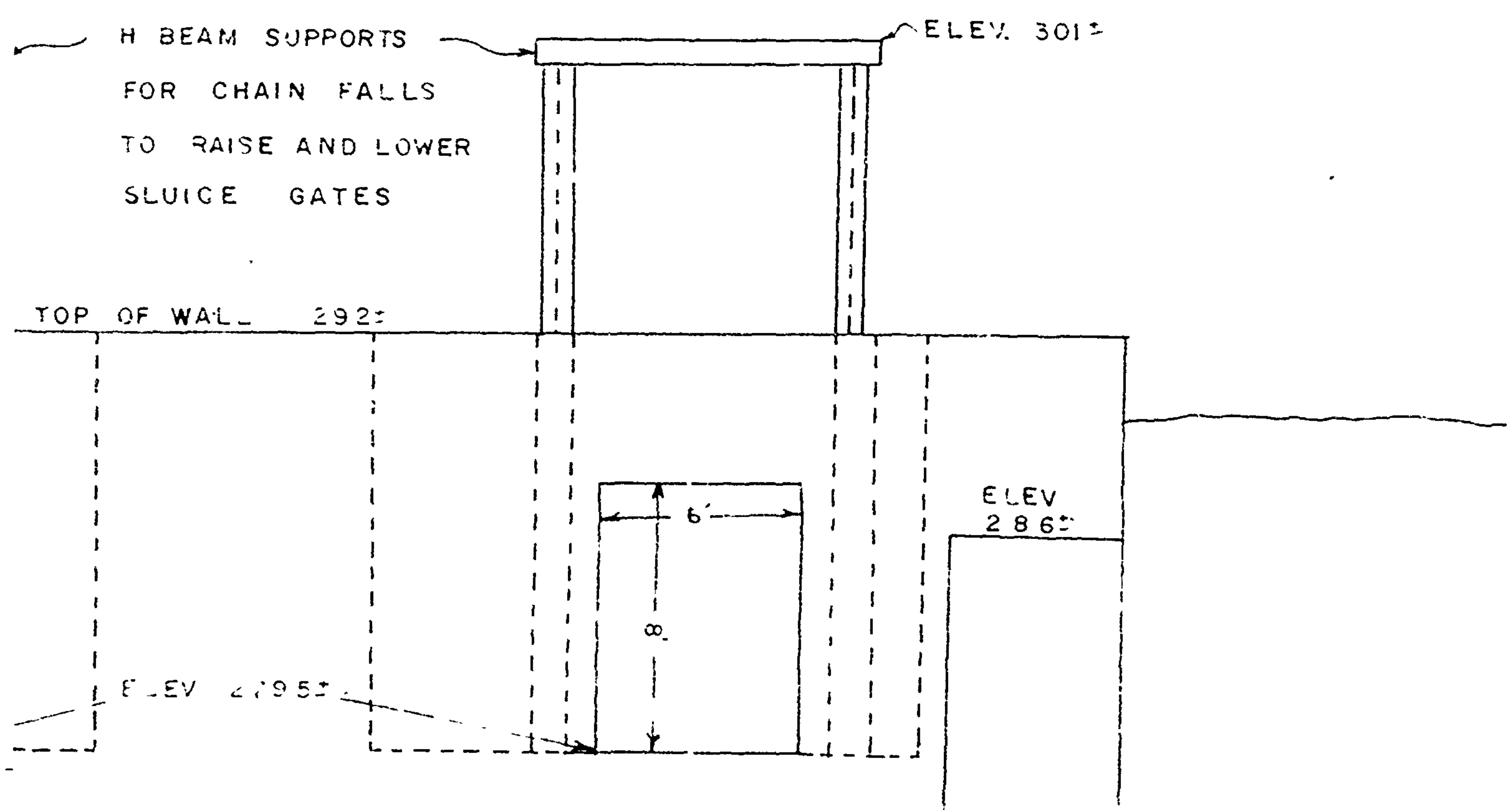
FD-18

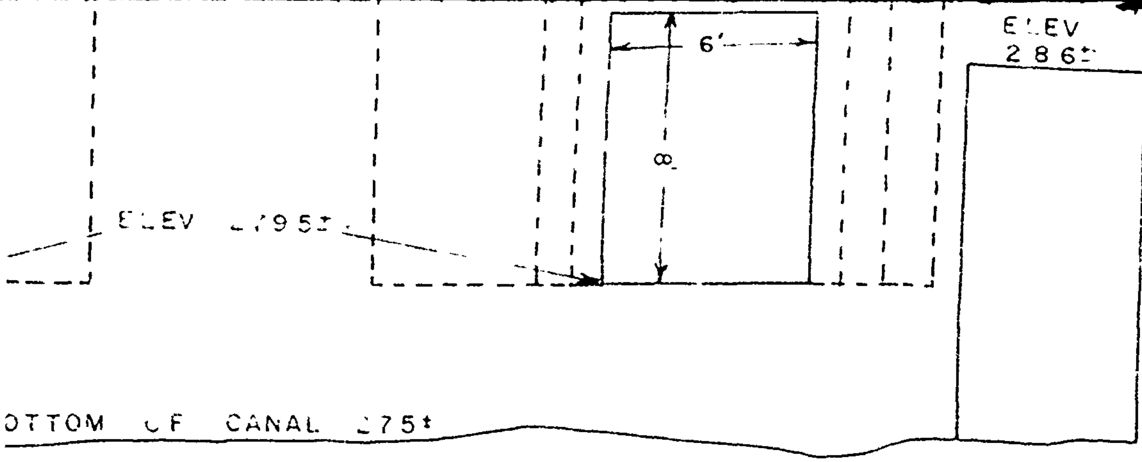


HUDSON RIVER
NEEDLE DAM SILL
290±
290±
65'±
ELEV 290±
ELEV 292±
ELEV 292±

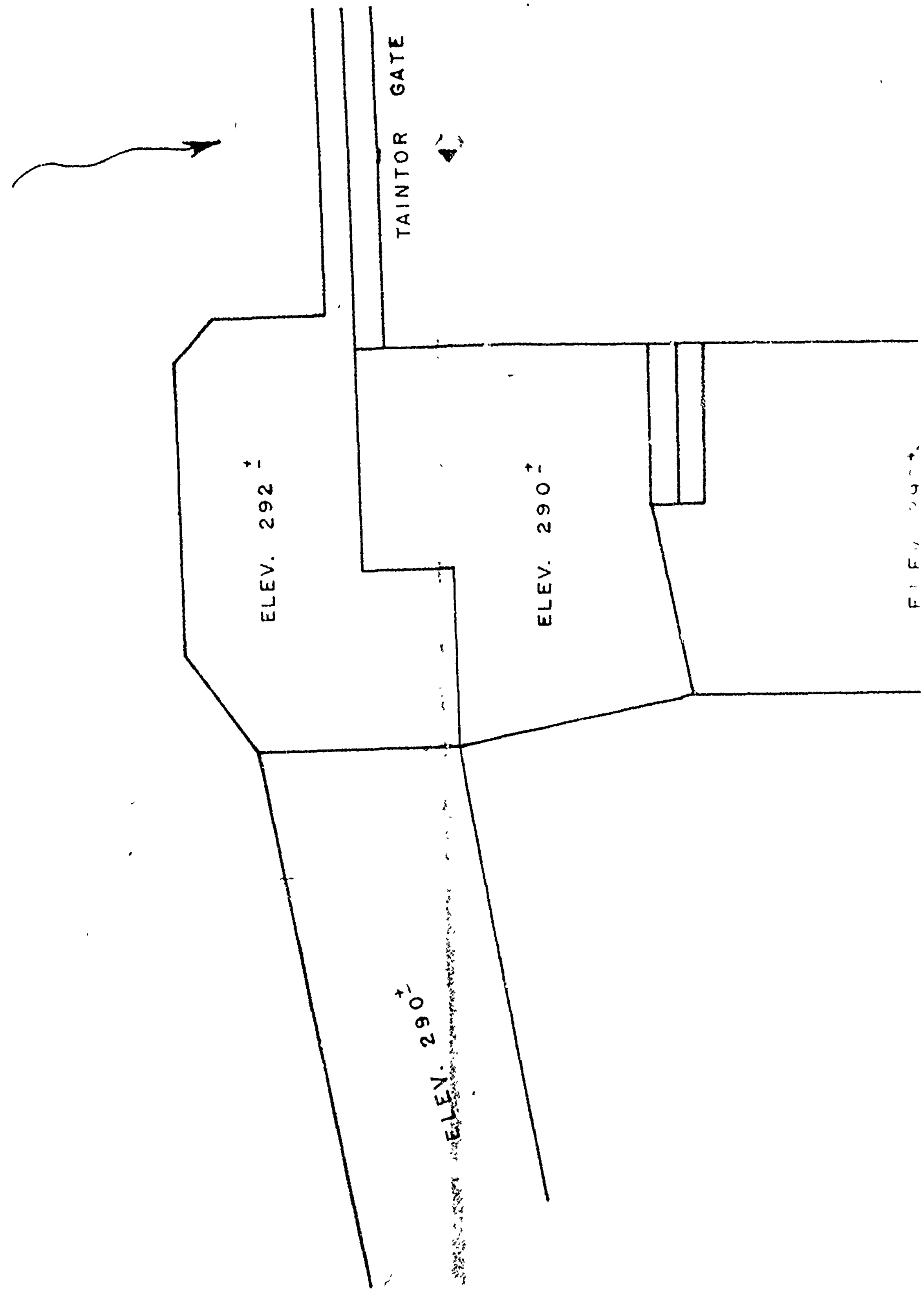


NOTE: THICKNESS OF SILL UNKNOWN
100'±
ELEV. 286±
ELEV. 284.5±
SLUICE GATE 7' X 9'
SILL ELEV. 279.5±
40'±
50'±
FALLS FEEDER CANAL
BOTTOM OF CANAL
ELEVATION 275±


H BEAM SUPPORTS
FOR CHAIN FALLS
TO RAISE AND LOWER
SLUICE GATES
ELEV. 301±
TOP OF WALL 292±
6'
8'
ELEV
286±
ELEV 295±



4

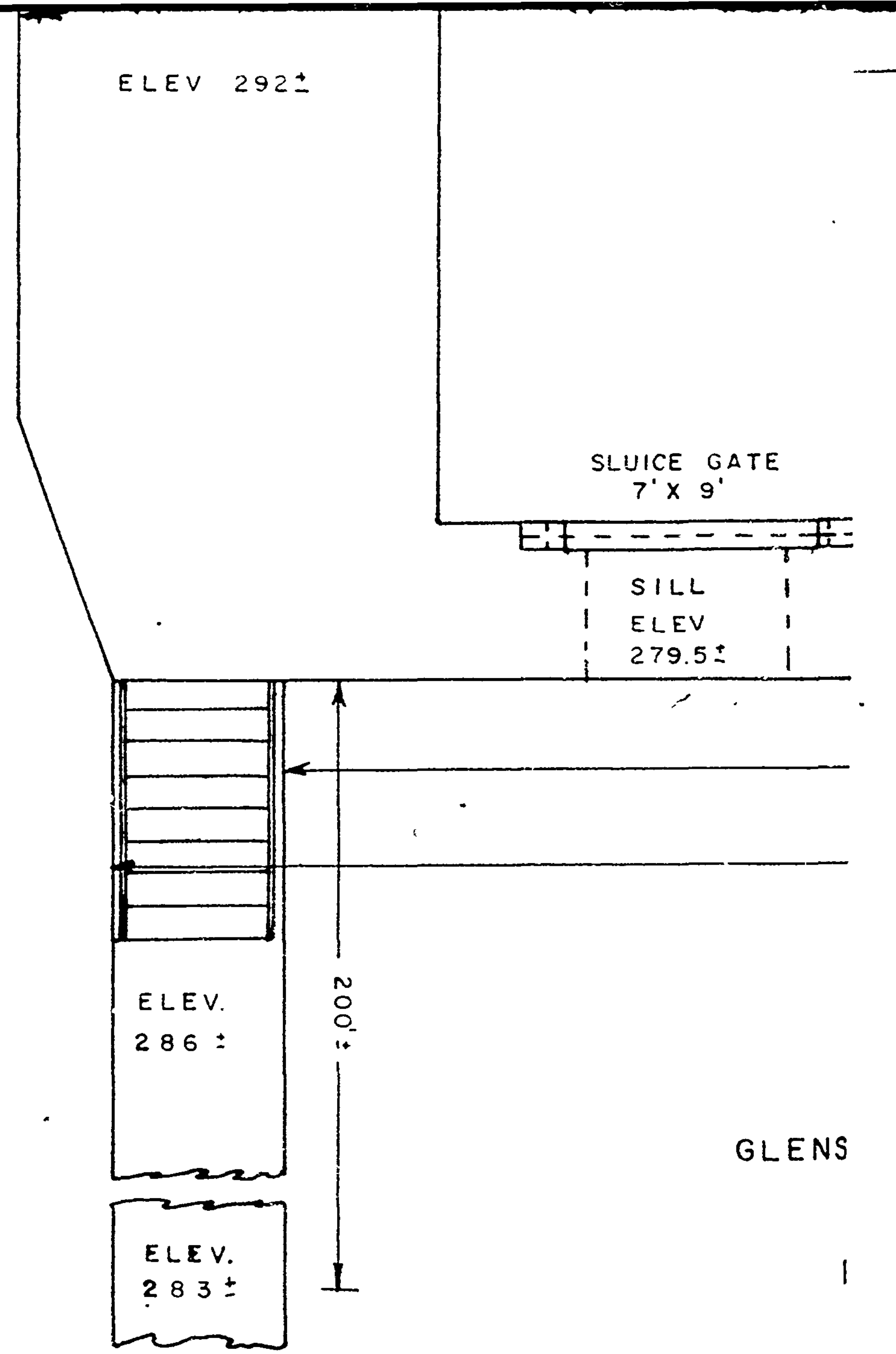


SKETCH BY J.E.H.

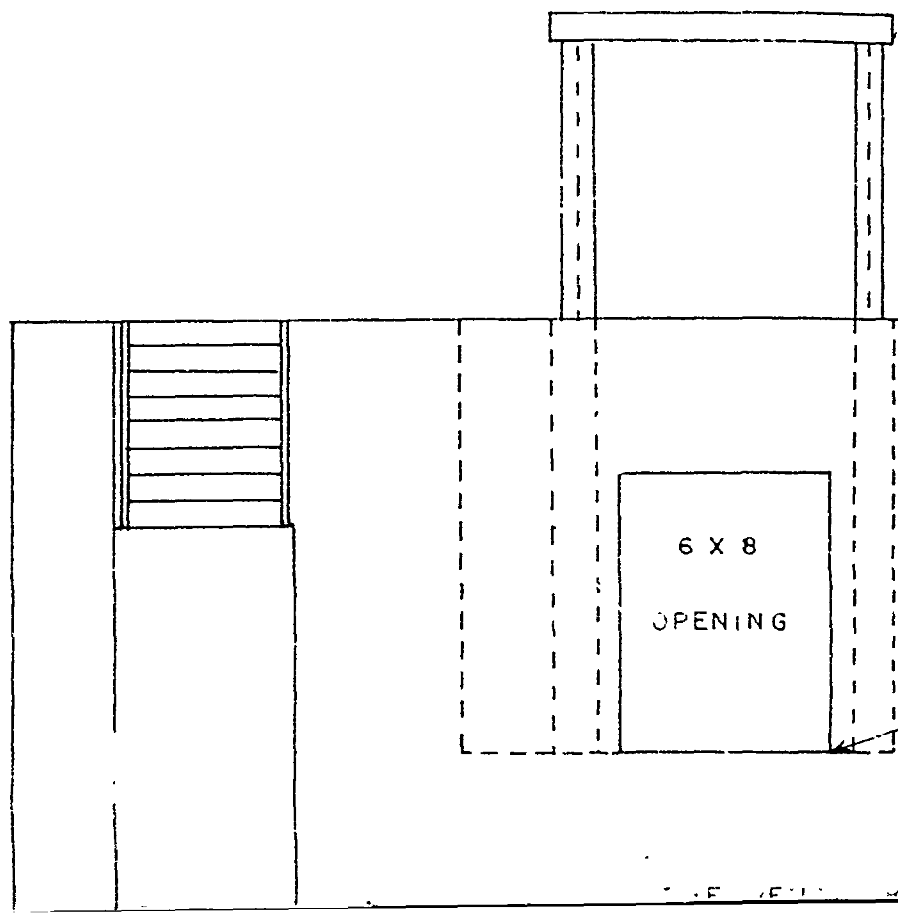
TRACED BY G.J.R.

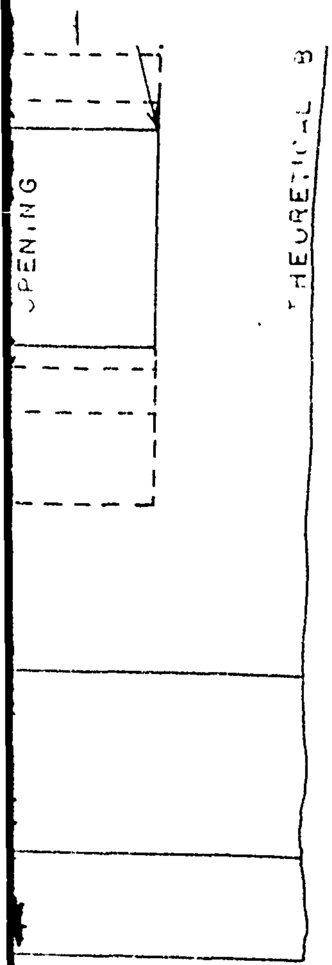
OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ASTROFILM 685 4 (IDF4) 17027

5


ELEV 292±
SLUICE GATE
7'X 9'
SILL
ELEV
279.5±
ELEV.
286 ±
ELEV.
283 ±
200'±
GLENS

6


6 X 8
OPENING

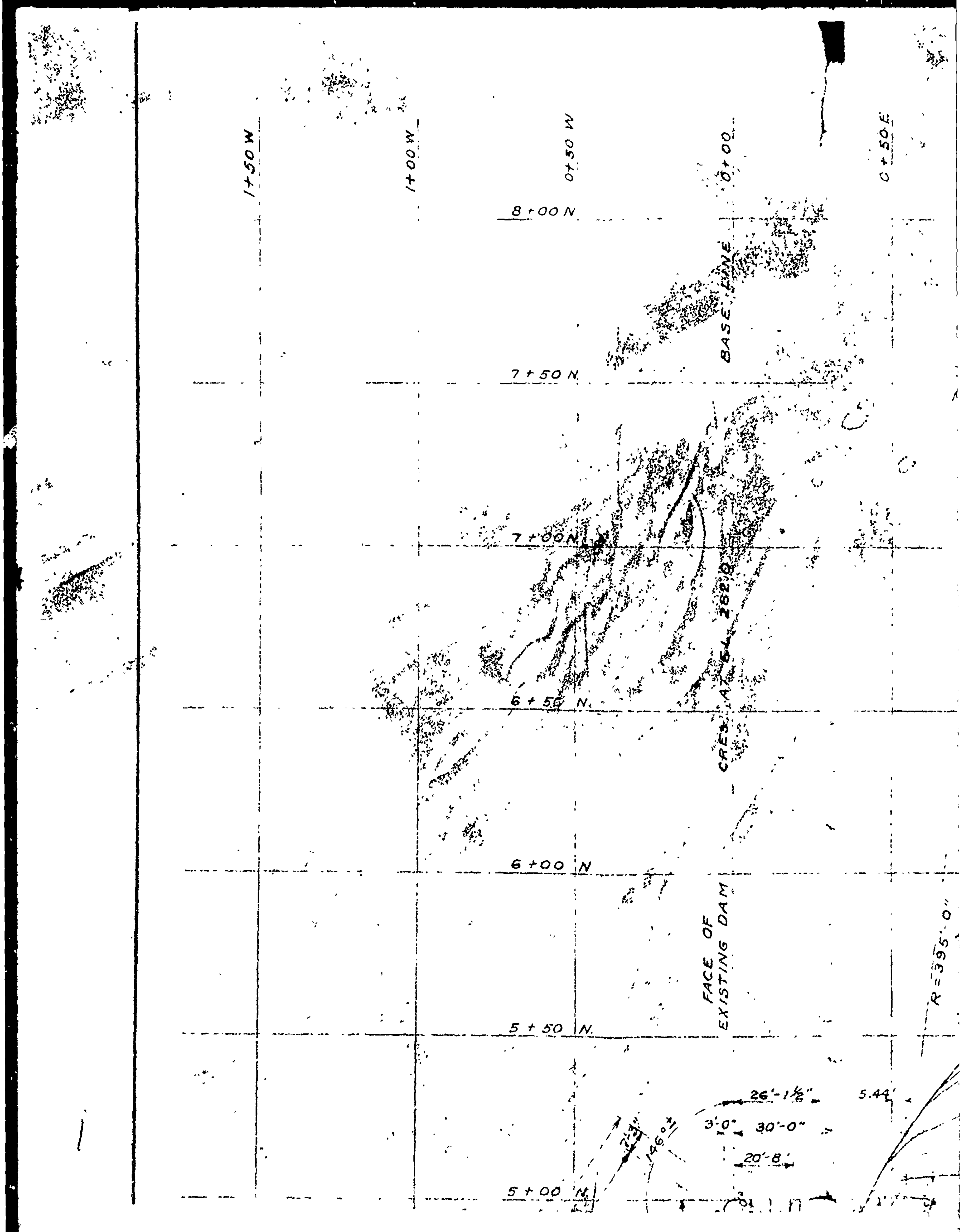


SKETCH

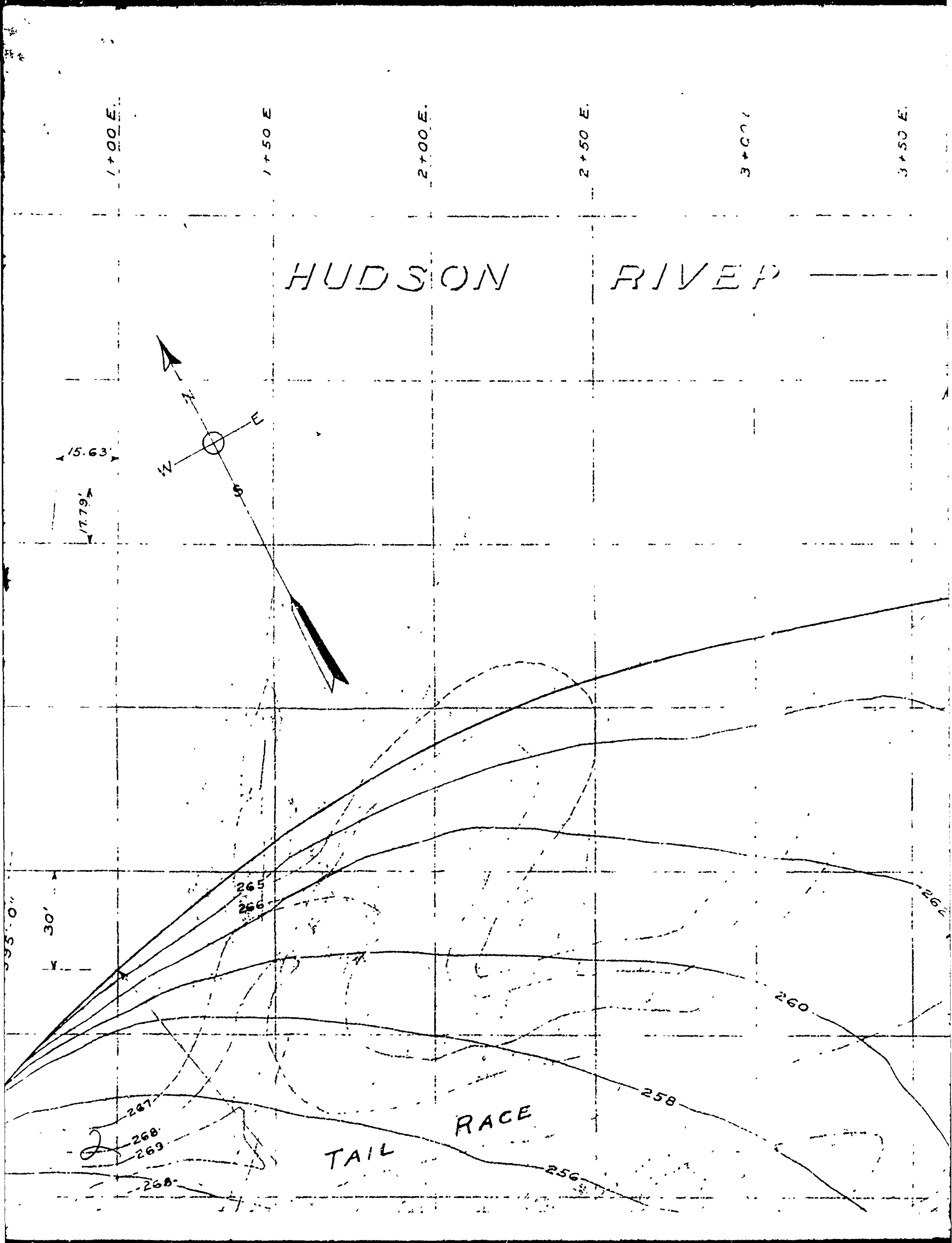
SHOWING PLAN AND DOWNSTREAM ELEVATION OF THE GLENS FALLS FEEDER CANAL INTAKE.

NO SCALE JULY 1968

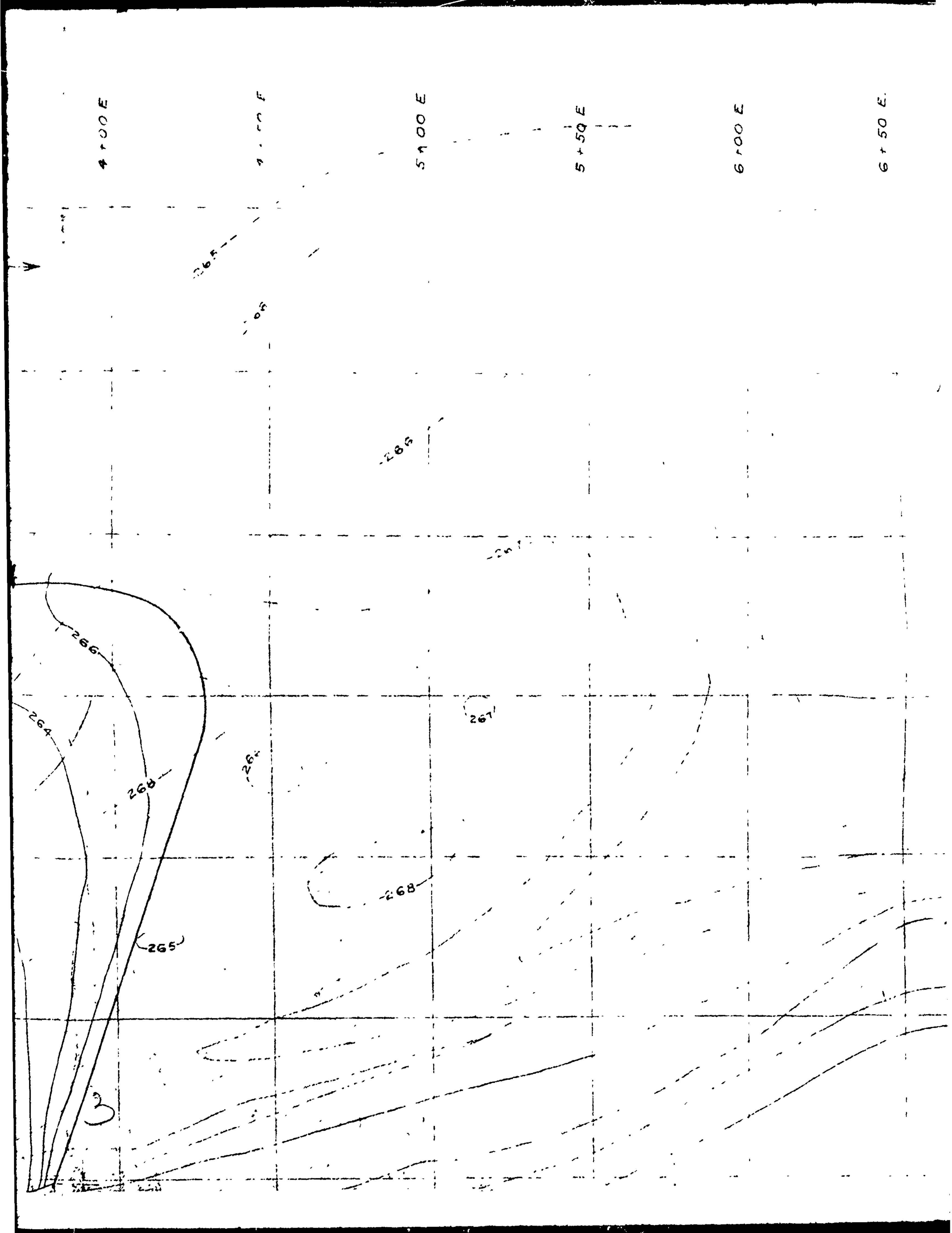
8

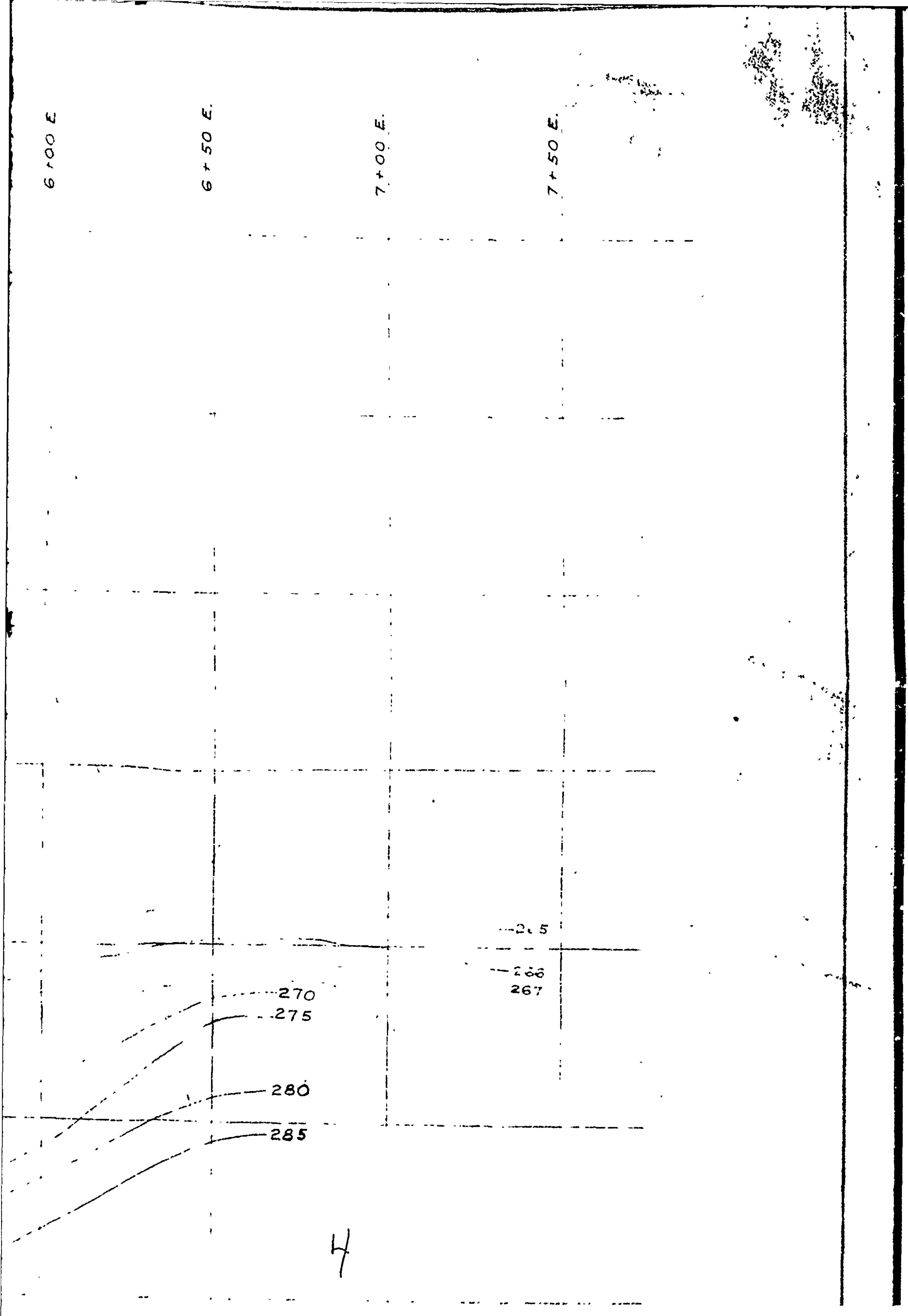


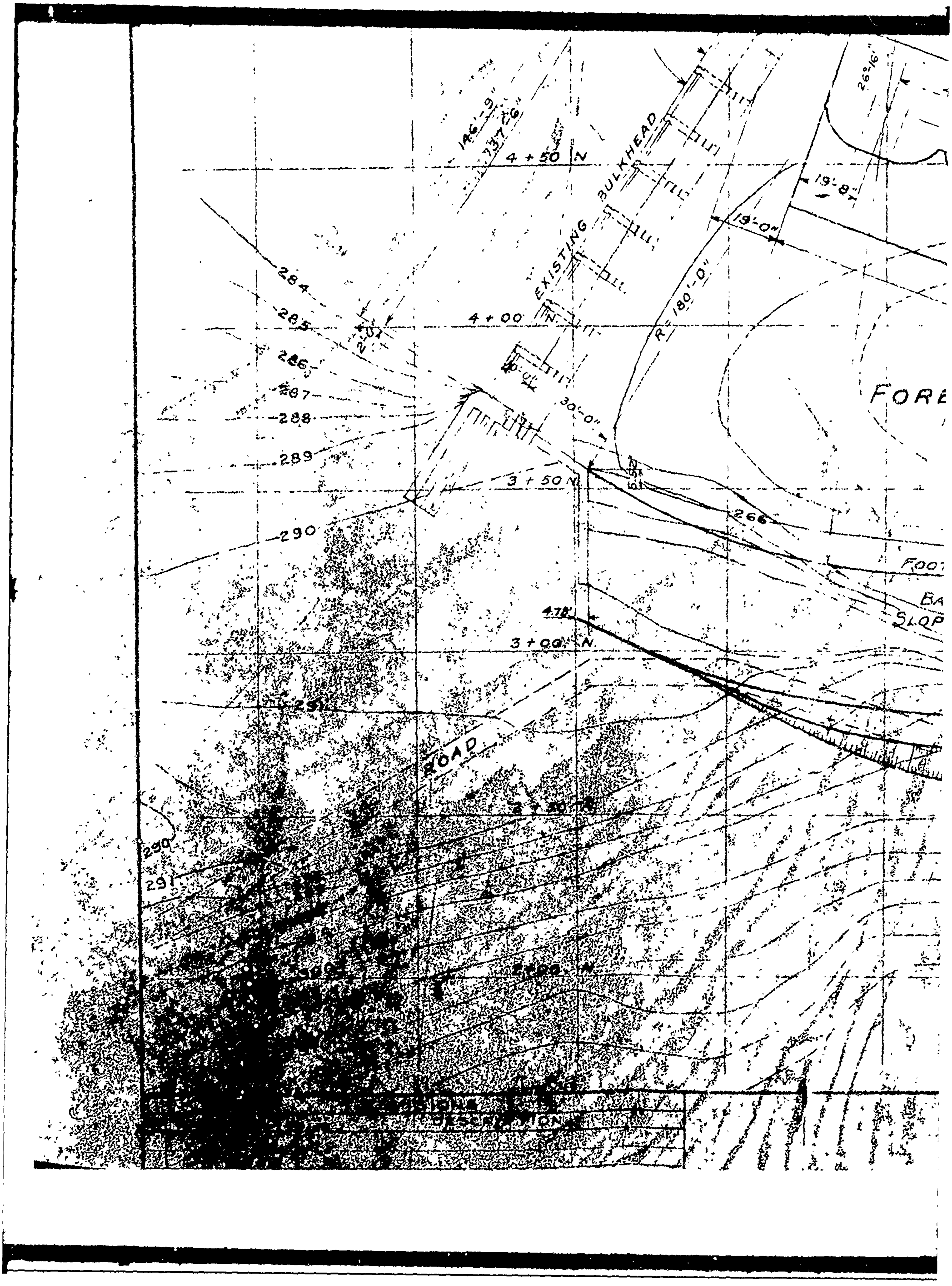
1+50 W
1+00 W
0+50 W
0+00
0+50 E
8+00 N
7+50 N
7+00 N
6+50 N
6+00 N
5+50 N
5+00 N
BASE LINE
CREST AT EL. 2820
FACE OF EXISTING DAM
R=395'-0"
26'-1 1/8"
5.44'
3'-0"
30'-0"
20'-8"



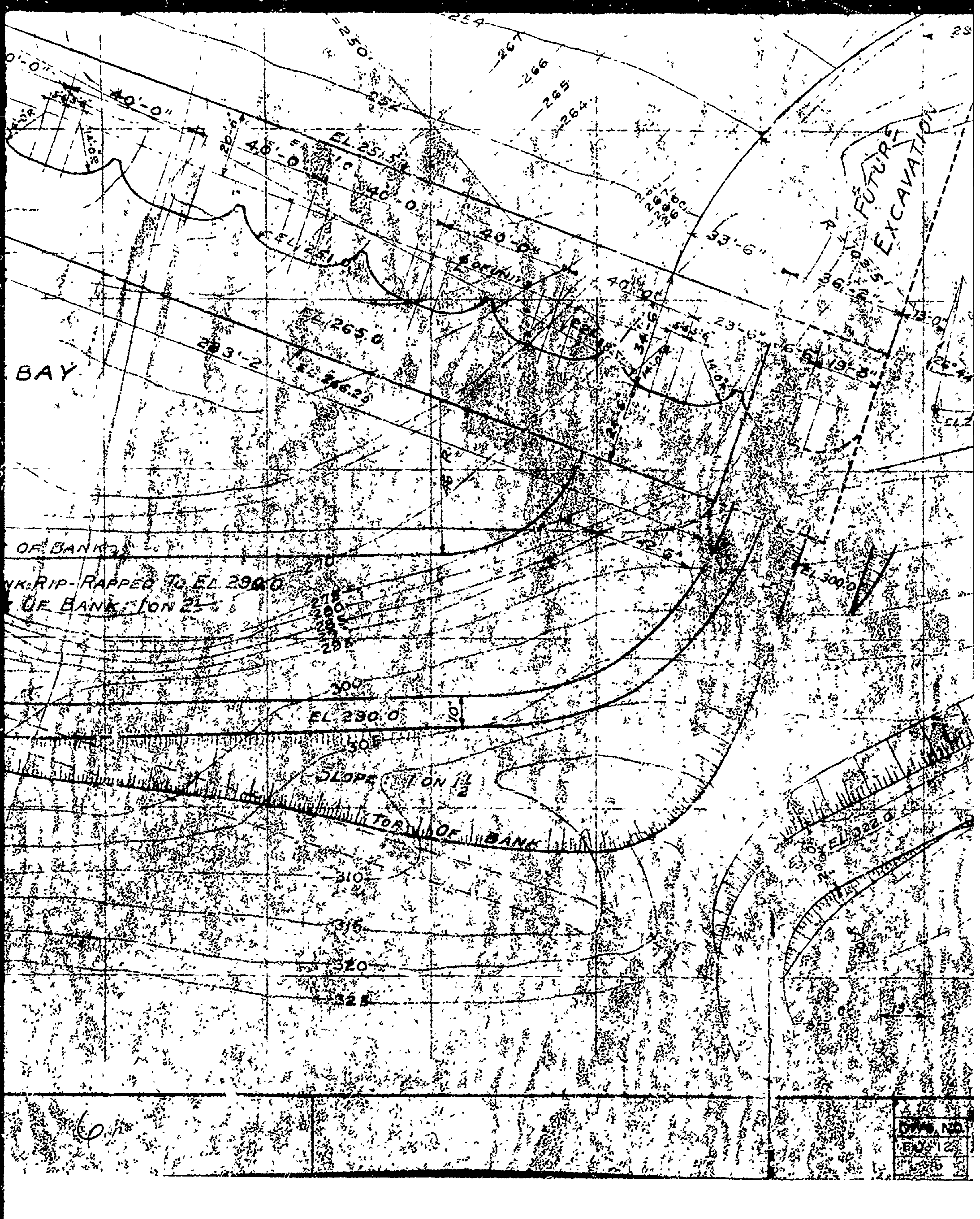
1+00 E.
1+50 E
2+00 E.
2+50 E.
3+50 E.
HUDSON RIVER
N
E
W
S
15.63'
17.79'
30'
265
266
260
258
267
268
269
268
256
TAIL RACE

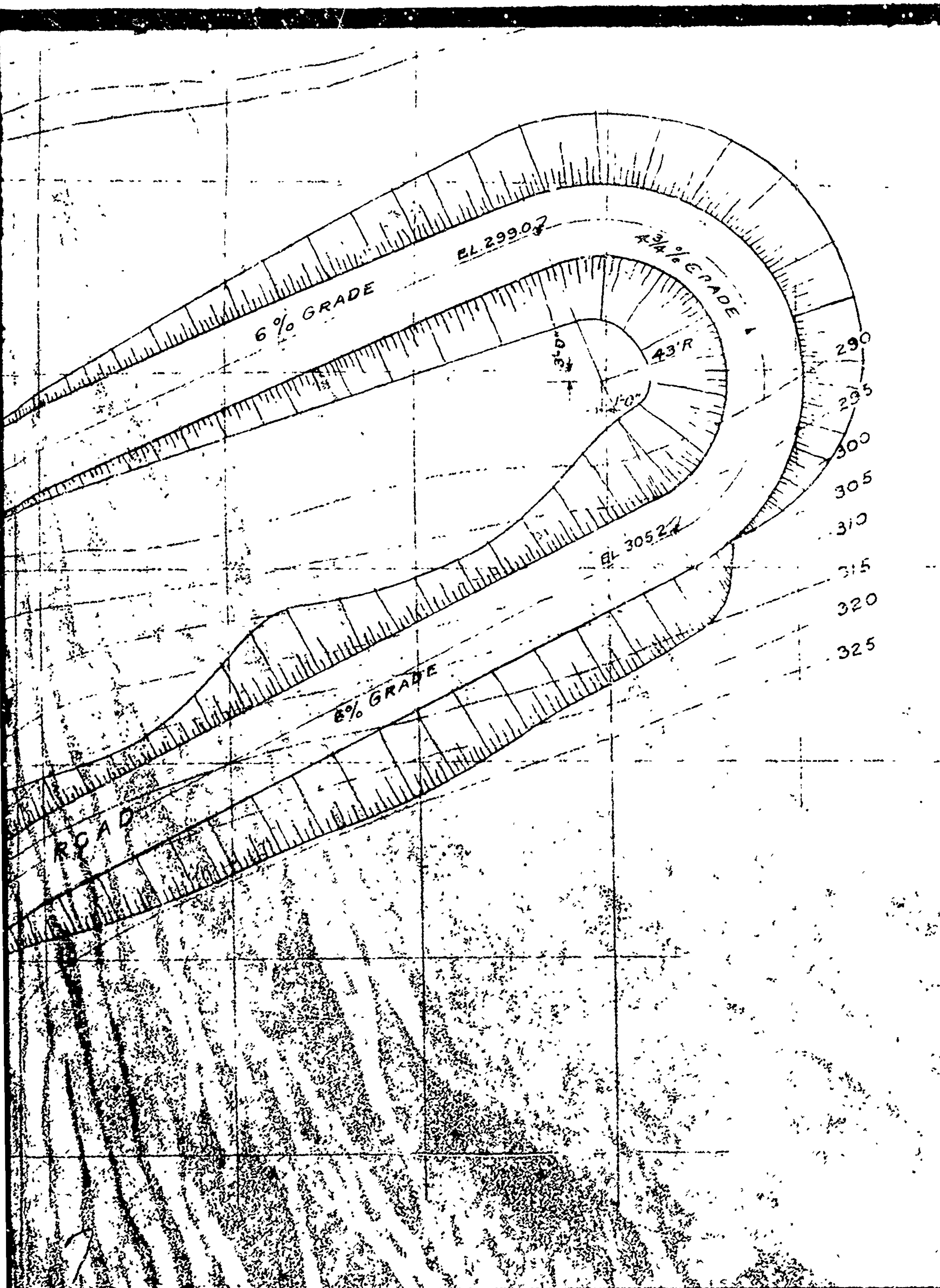

4+00 E
5+00 E
5+50 E
6+00 E
6+50 E
265
266
264
268
267
265
3


6+00 E
6+50 E.
7+00 E.
7+50 E.
270
275
280
285
267
4



146'-9"
737'-6"
4 + 50 N
EXISTING BULKHEAD
26°16'
19'-8"
19'-0"
R = 180'-0"
284
285
286
287
288
289
290
4 + 00
30'-0"
FORE
3 + 50 N
266
FOOT
BA
SLOP
4.78'
3 + 00 N.
291
ROAD
290
291
DESCRIPTION


FUTURE EXCAVATION
BAY
EL 251.5
EL 251.0
EL 265.0
EL 266.25
293'-2"
OF BANK
BANK RIP-RAPPED TO EL 290.0
OF BANK 1 ON 2
EL 290.0
EL 300.0
SLOPE 1 ON 1 1/2
TOP OF BANK
EL 322.0
DWG. NO.



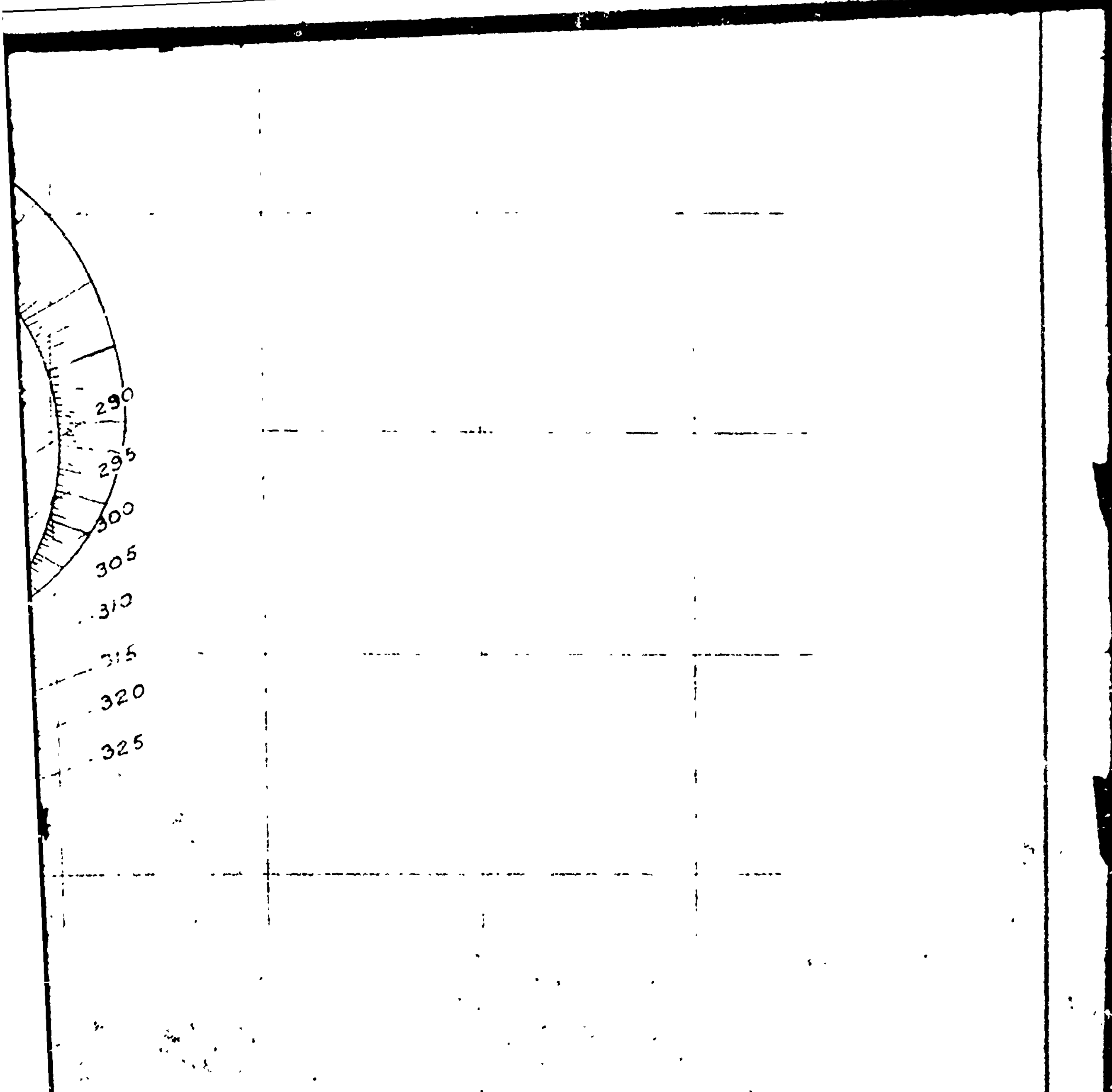
MOREA

FEEDE

PLAN
FOREBA

SCALE: 1"=
CHECKED B

REFERENCE DRAWINGS	APPROVALS
TITLE	
... EXCAVATION FOR FOREBAY ... TAILRACE	CHIEF ENGINEER



MOREAU MANUFACTURING CO.

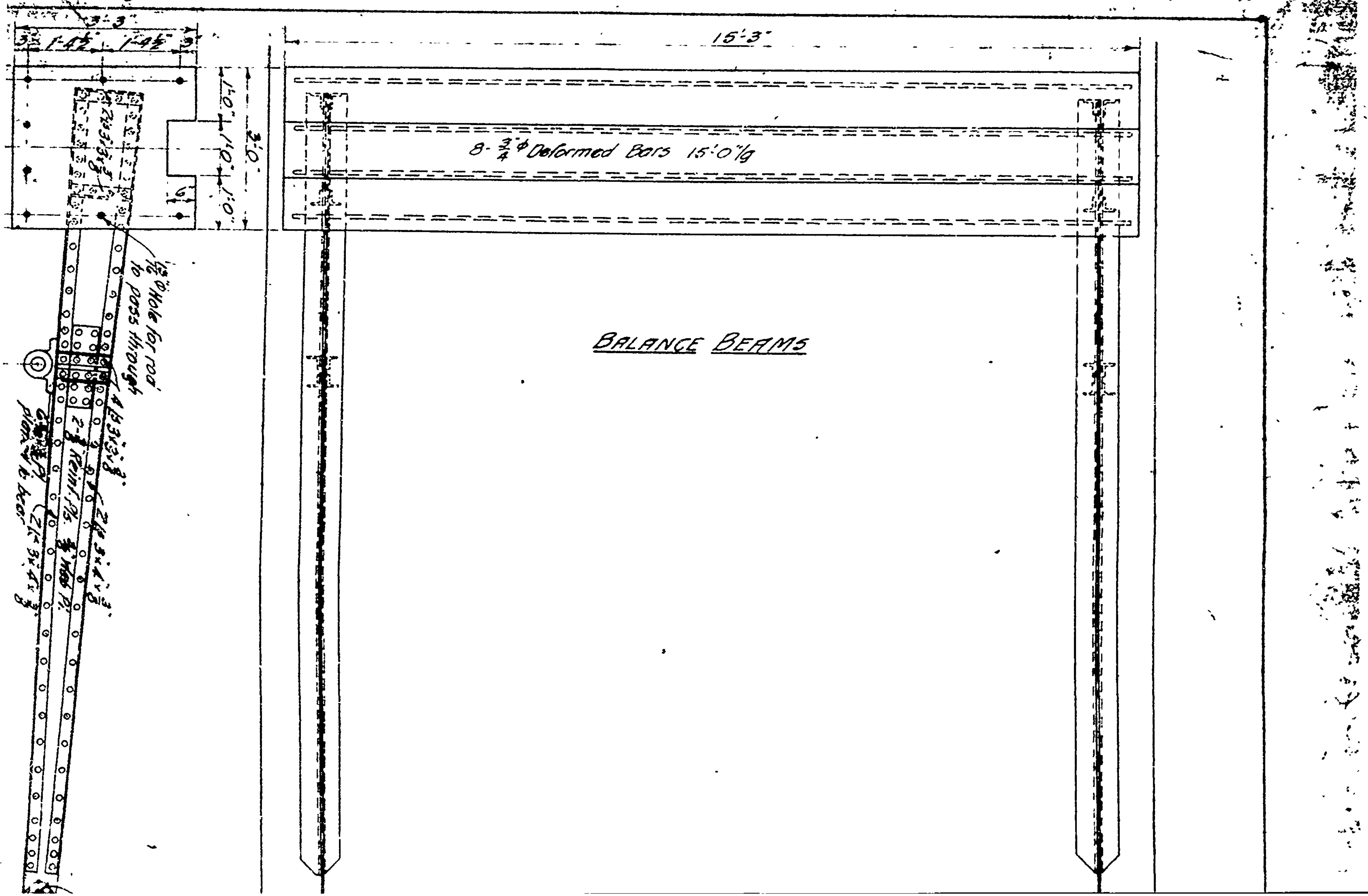
GLENS FALLS N.Y.

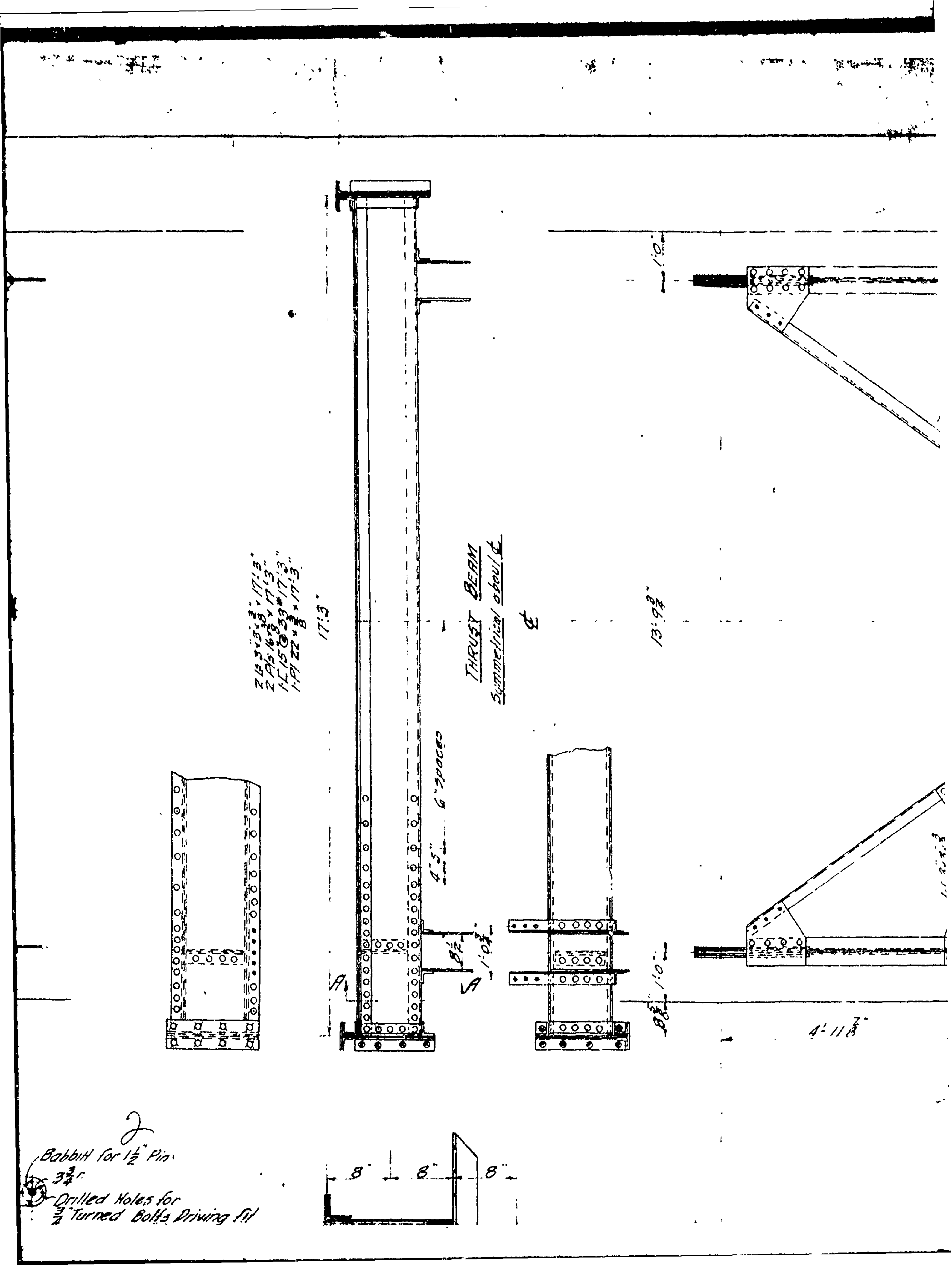
FEEDER DAM DEVELOPMENT.

PLAN SHOWING EXCAVATION FOR
FOREBAY, POWER HOUSE AND TAIL RACE.

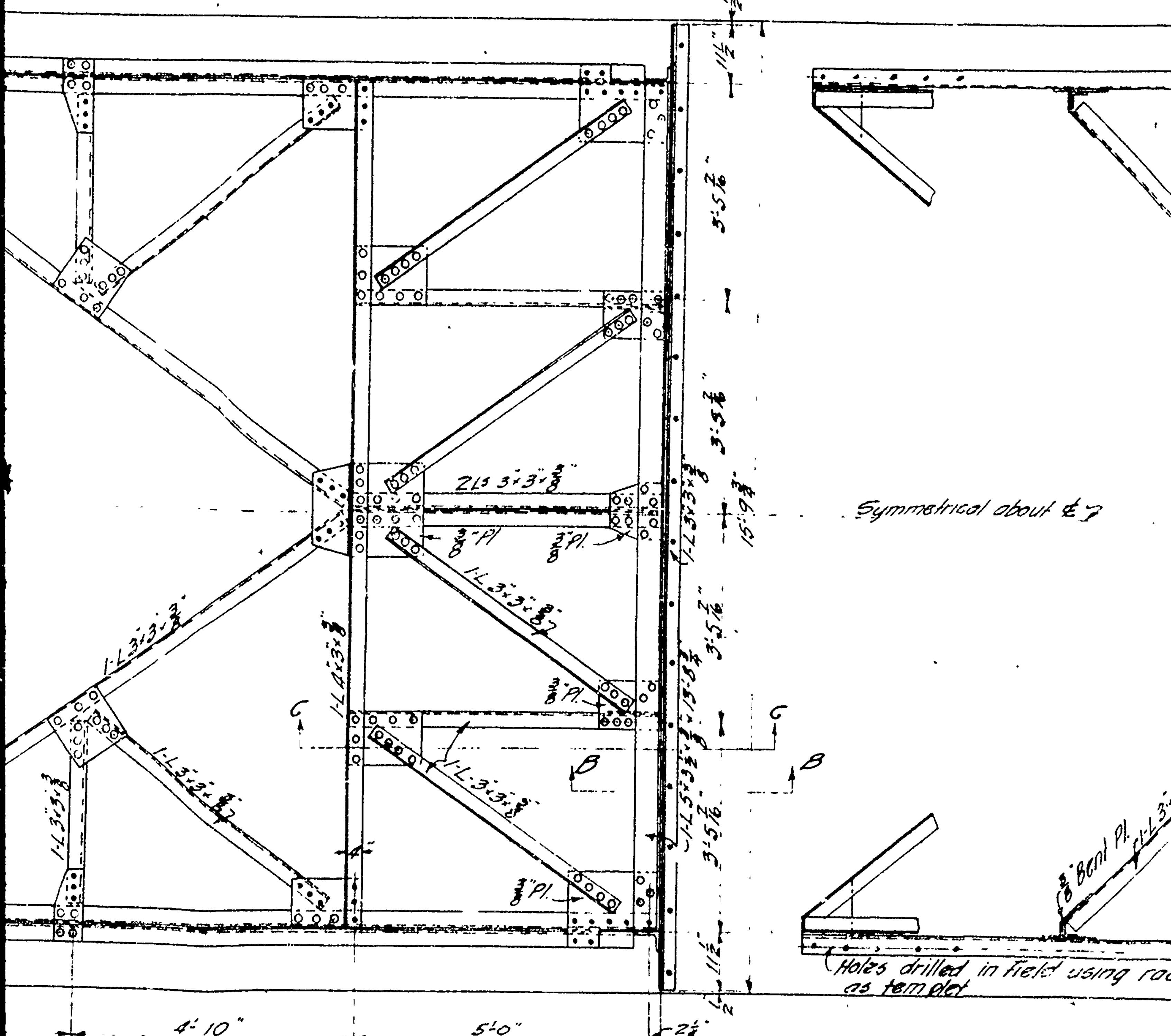
SCALE: 1" = 30' 8 MADE BY: J. K

CHECKED BY: W.K. 7/13/23 DATE: MAY 22, 1923

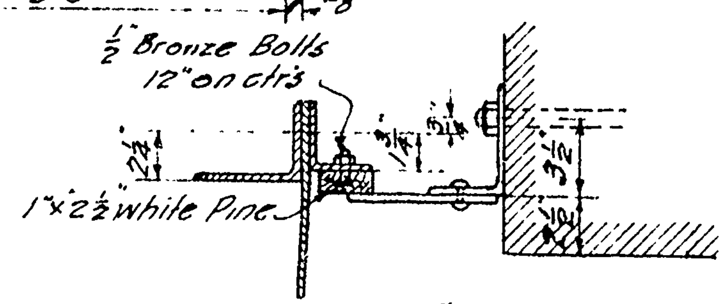

BALANCE BEAMS
15'-3"
8-3/4"⌀ Deformed Bars 15'-0" l/g
3'-0"
1'-0" 1'-0" 1'-0"
3'-3"
1'-4½" 1'-4½"
13/16"⌀ Hole for rod to pass through
4 Ls 3x3x3/8
2 Ls 3x4x3/8
2-3/8 Reinf. Pls. 3/8 Web Pl.
2 Ls 3x3x3/8
planed to bear
2 Ls 3x4x3/8



THRUST BEAM
Symmetrical about ℄
17'3"
13'9¾"
1'0"
6" spaces
4'5"
1'0¾"
A
Babbitt for 1½" Pin
3¾ r
Drilled Holes for ¾ Turned Bolts Driving fit
8"
8"
8"



PLAN OF TOP TRUSS
Bottom truss similar



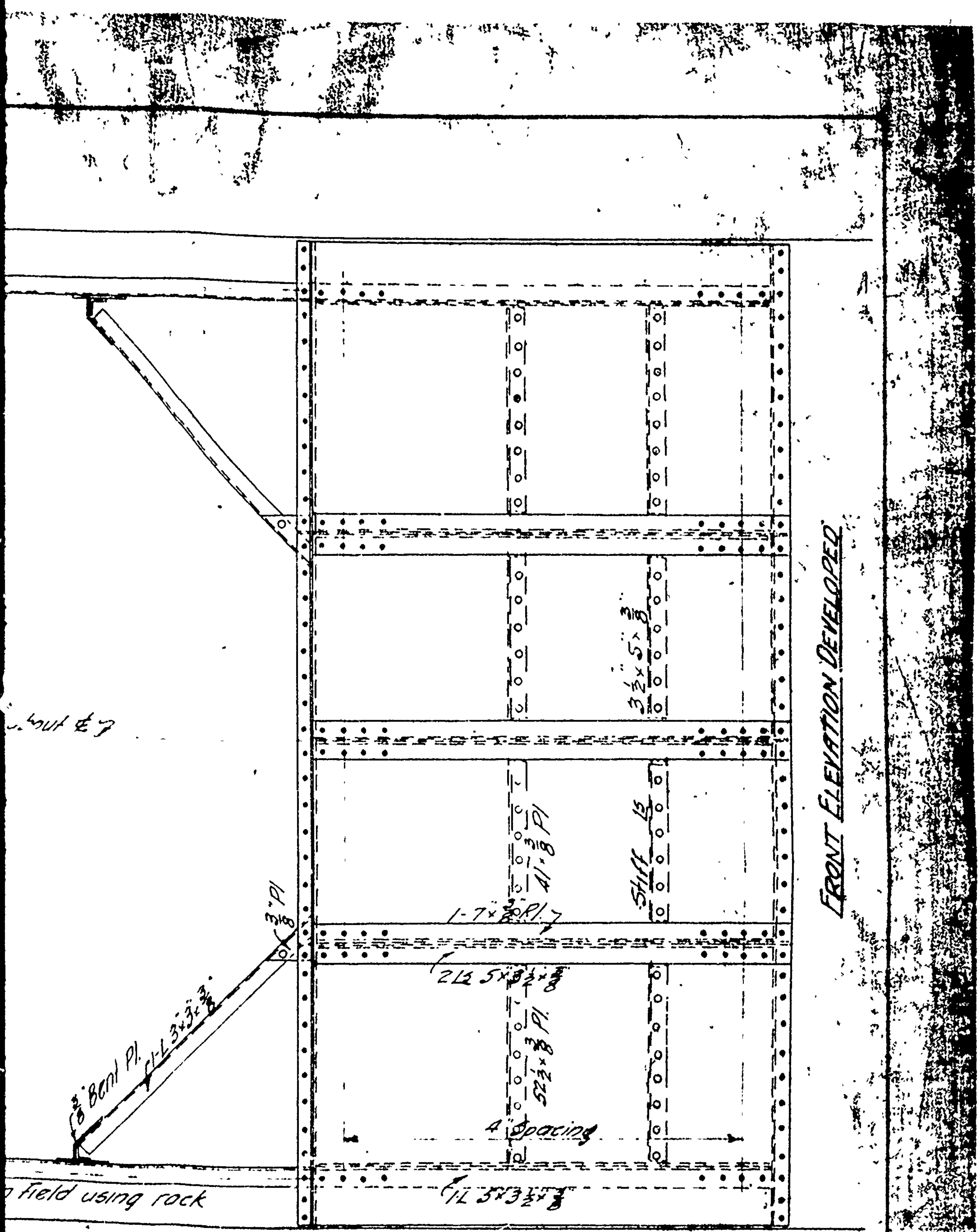
SECTION "B-B"

All mate

All rivet

All holes

3

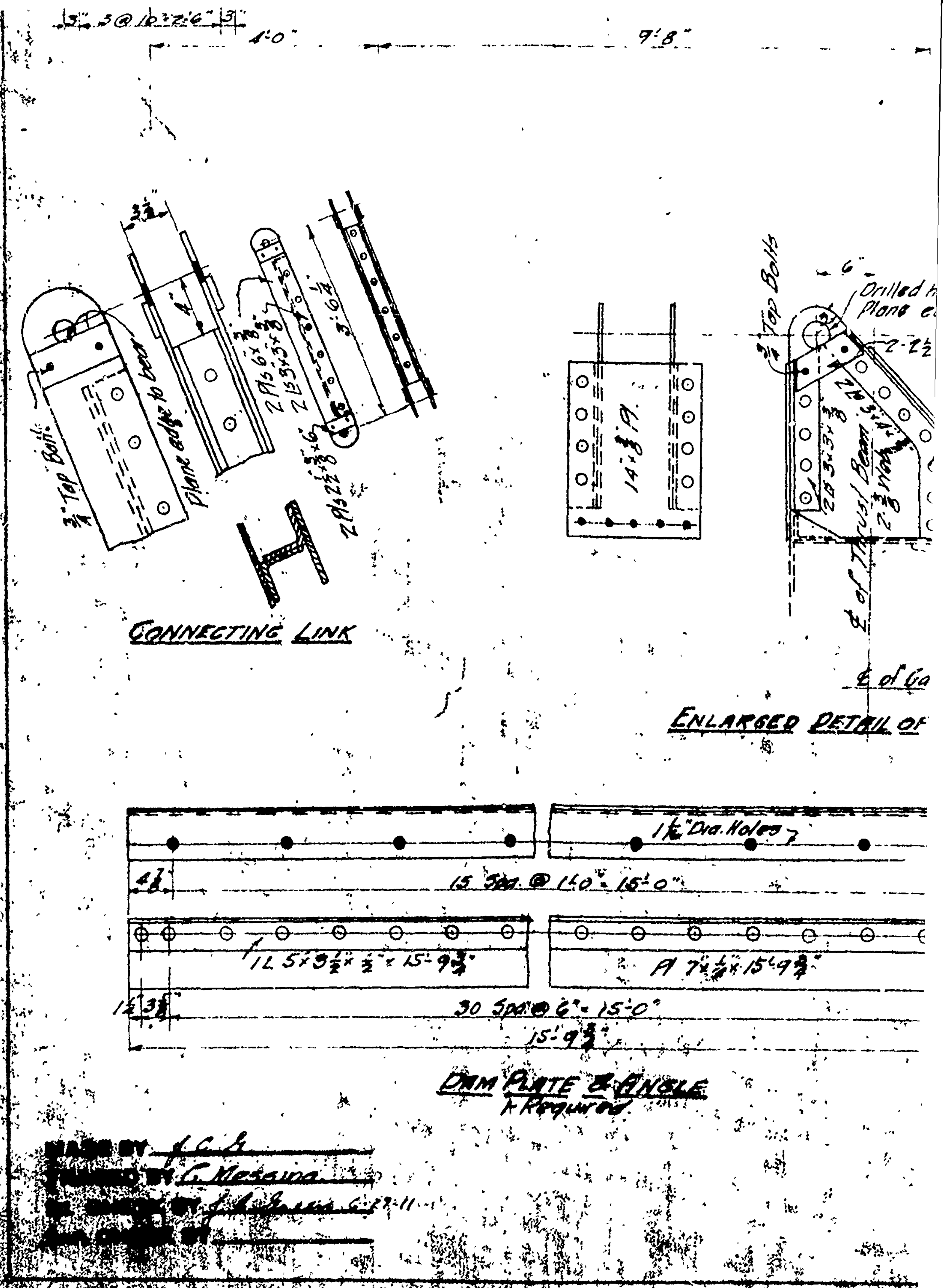


All material medium O.H. Steel

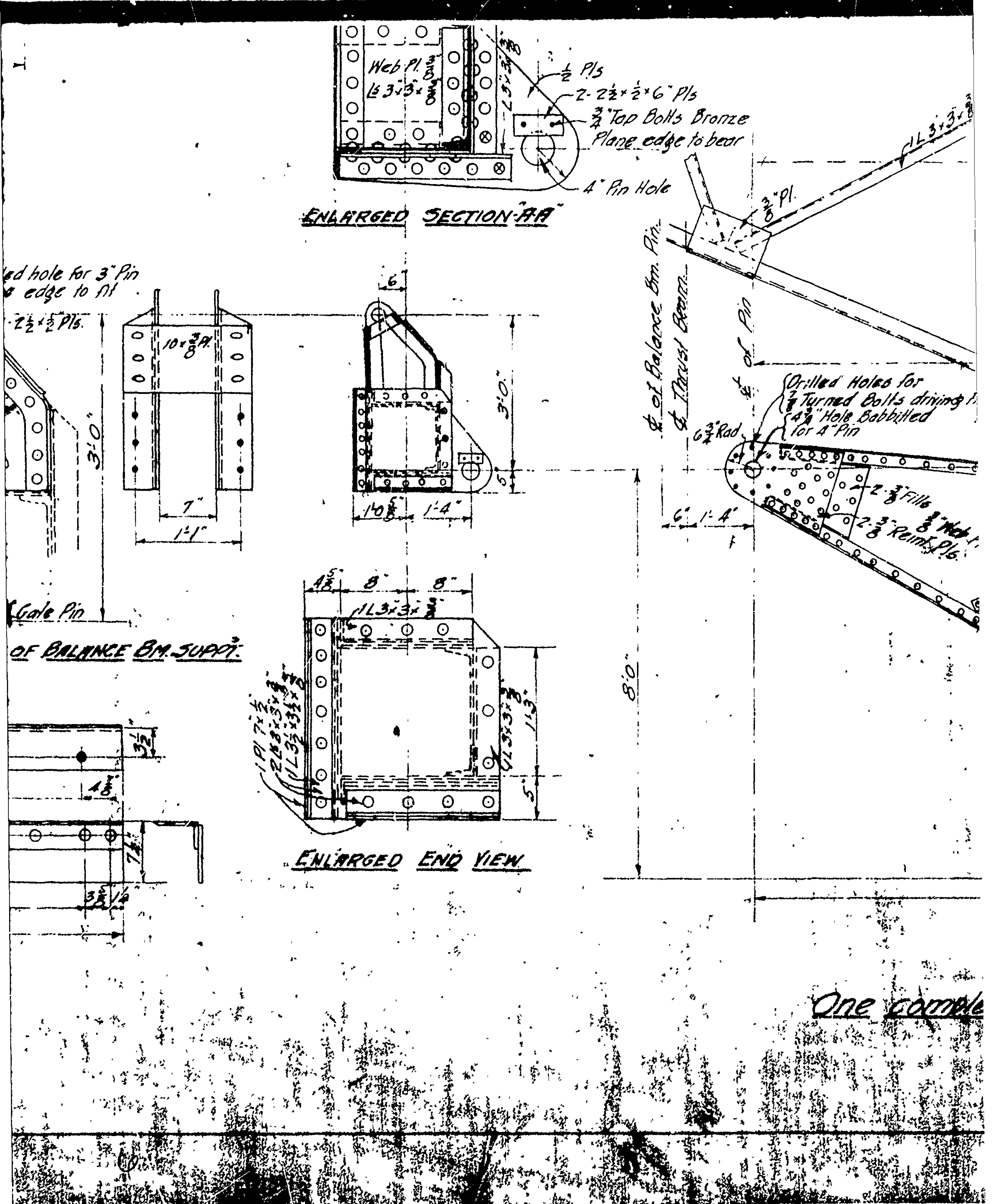
All rivets 3/4" ϕ } unless otherwise noted
All holes 13/16" ϕ }

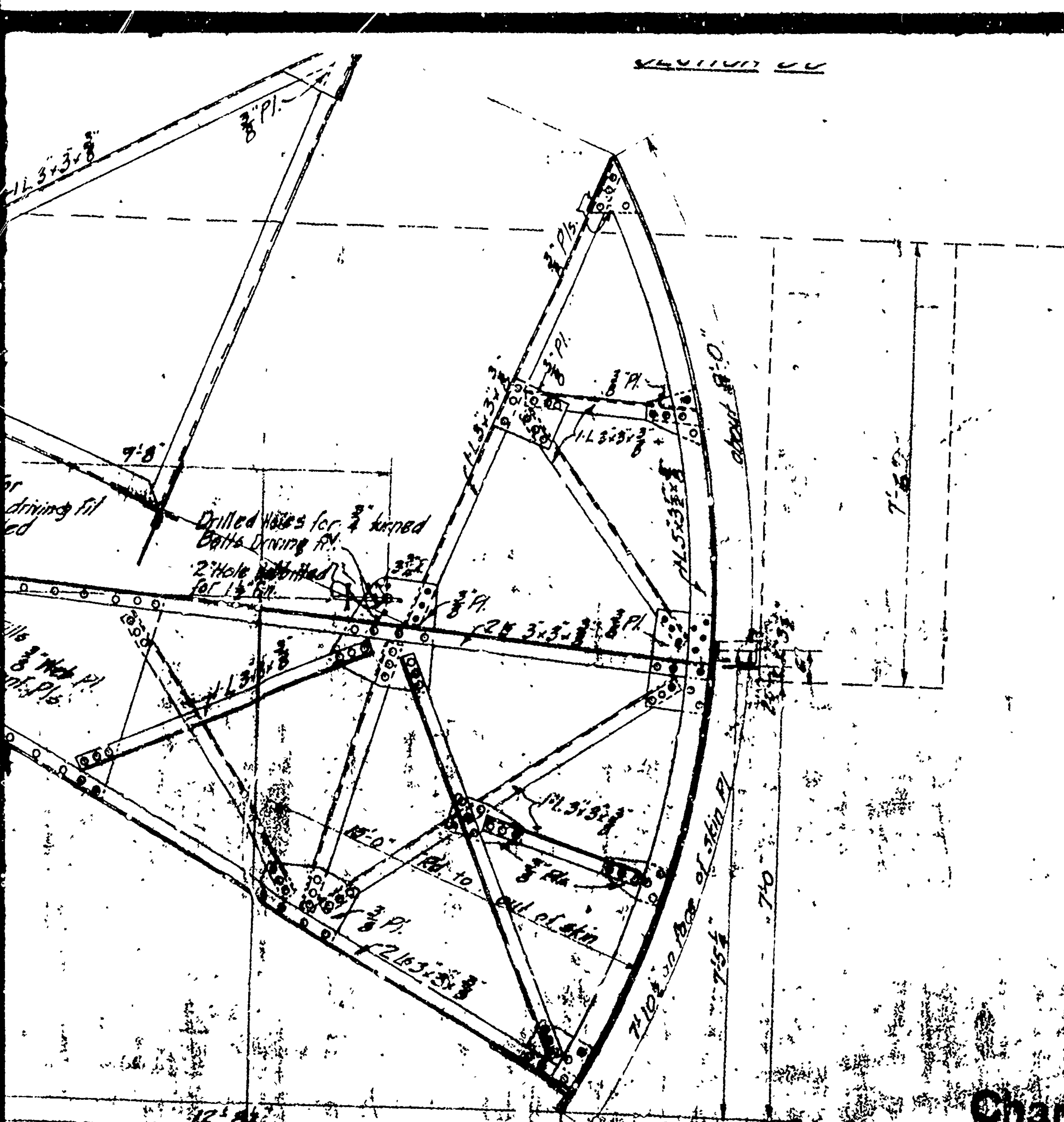
4

Scale 1/2" = 1'-0"



3" 3@10"=2'-6" 3"
4'-0"
9'-8"
3½"
4"
¾" Tap Bolt
Plane edge to bear
2 Pls 6×⅜"
2 Ls 3×3×⅜"
3'-6½"
2 Pls 2½×⅜"×6"
CONNECTING LINK
14×⅜ Pl.
¾" Tap Bolts
6"
Drilled
Plane
2-2½
2 Ls 3×3×⅜
Thrust Beam
ENLARGED DETAIL OF
1⅛" Dia. Holes
4⅛
15 Spa. @ 1'-0" = 15'-0"
1 L 5×3½×½×15'-9¾"
Pl 7¼×¼×15'-9¾"
1¾ 3½
30 Spa. @ 6" = 15'-0"
15'-9¾"
DAM PLATE & ANGLE
1 Required
J.C.G.
C. Mataina
6-29-11


Web Pl. 3/8
Ls 3x3x3/8
1/2" Pls
2-2 1/2 x 1/2 x 6" Pls
3/4" Tap Bolts Bronze
Plane edge to bear
4" Pin Hole
ENLARGED SECTION "A-A"
1L 3x3x3/8
3/8" Pl.
℄ of Balance Bm. Pin.
℄ Thrust Beam.
℄ of Pin
Drilled Holes for
7/8 Turned Bolts driving fit
4 1/4" Hole Babbitted
for 4" Pin
6 3/4" Rad.
2-3/8" Fills
3/8" Web Pl.
2-3/8" Reinf. Pls.
6"
1'-4"
8'-0"
ed hole for 3" Pin
edge to fit
2 1/2 x 1/2 Pls.
10 x 3/8 Pl.
3'-0"
7"
1'-1"
6
3'-0"
5"
1'-0 5/8"
1'-4"
℄ Gate Pin
OF BALANCE BM. SUPPT.
4 5/8
8"
8"
1L3x3x3/8
1 Pl 7x1/2
2Ls 3x3x3/8
1L 3 1/2 x 3 1/2 x 3/8
1L3x3x3/8
1'-3"
5"
3 1/2
4 5/8
7 1/2
3 5/8
1/2
ENLARGED END VIEW
One comple

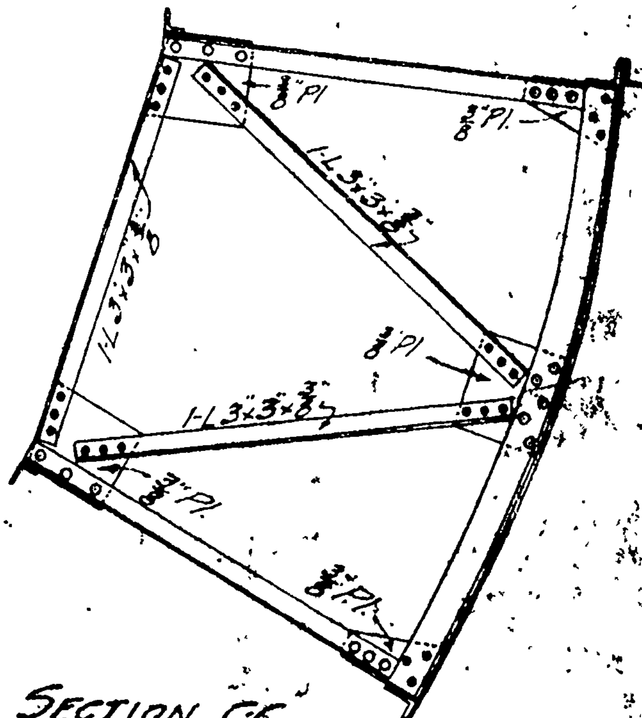


END ELEVATION

...mplete Gate wanted

Con...

Champlain...



SECTION C-C

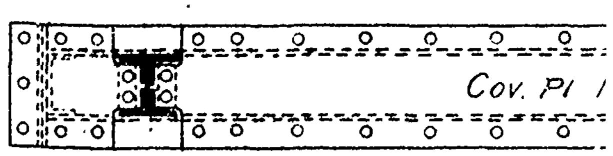
Contract No. 56.

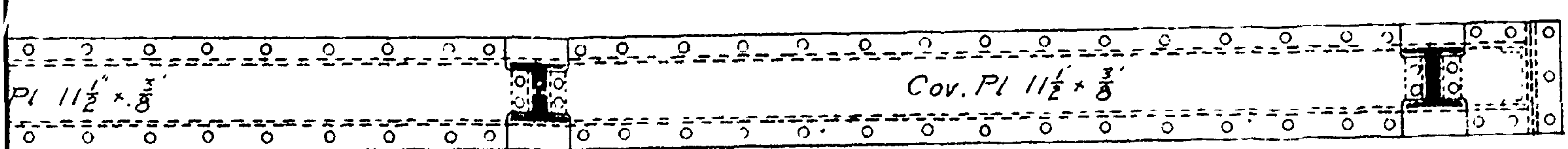
...lain Canal Section 2

Glens Falls Feeder

...ETAILS OF TAINTOR GATE

Scales as indicated

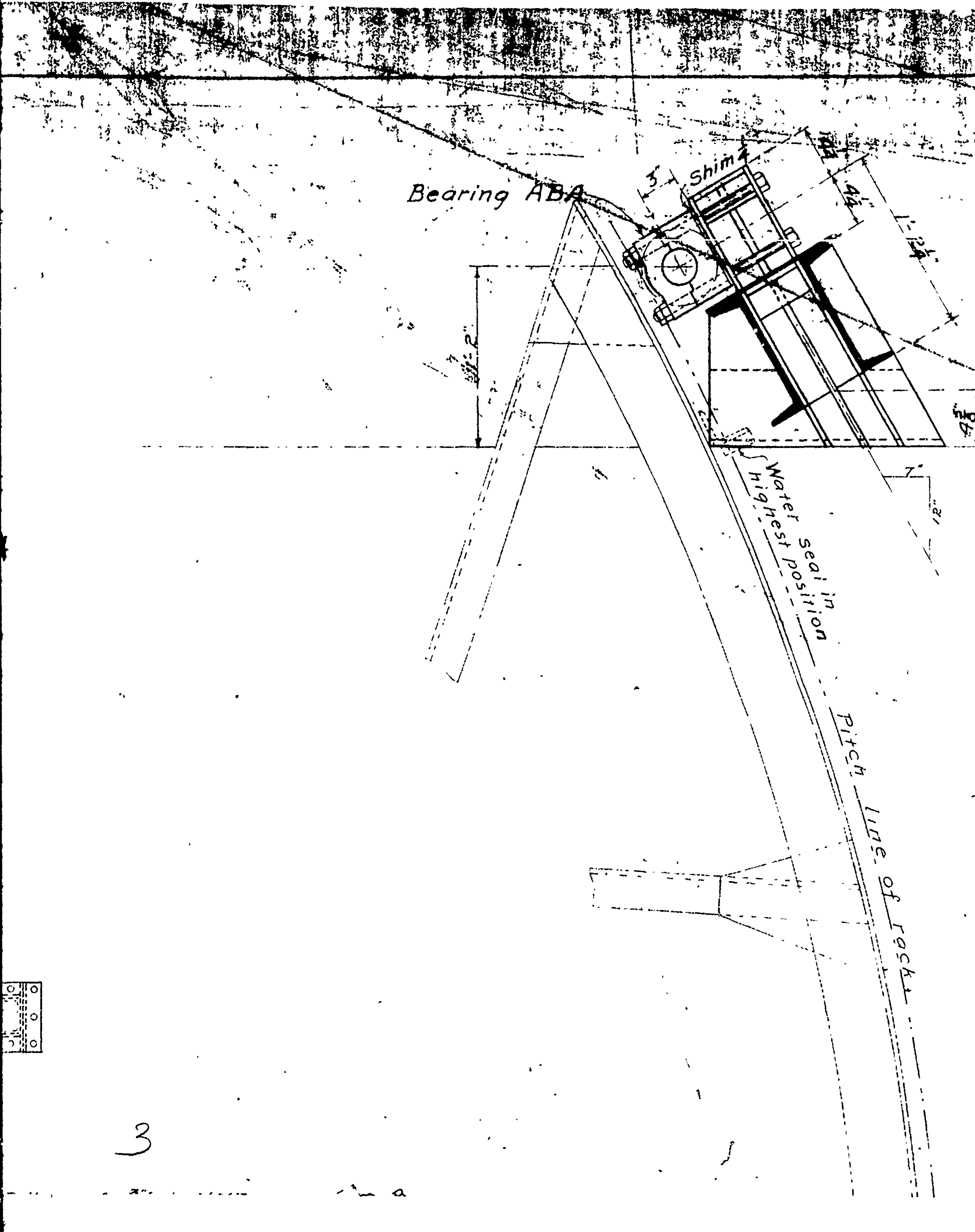

Cov. Pl



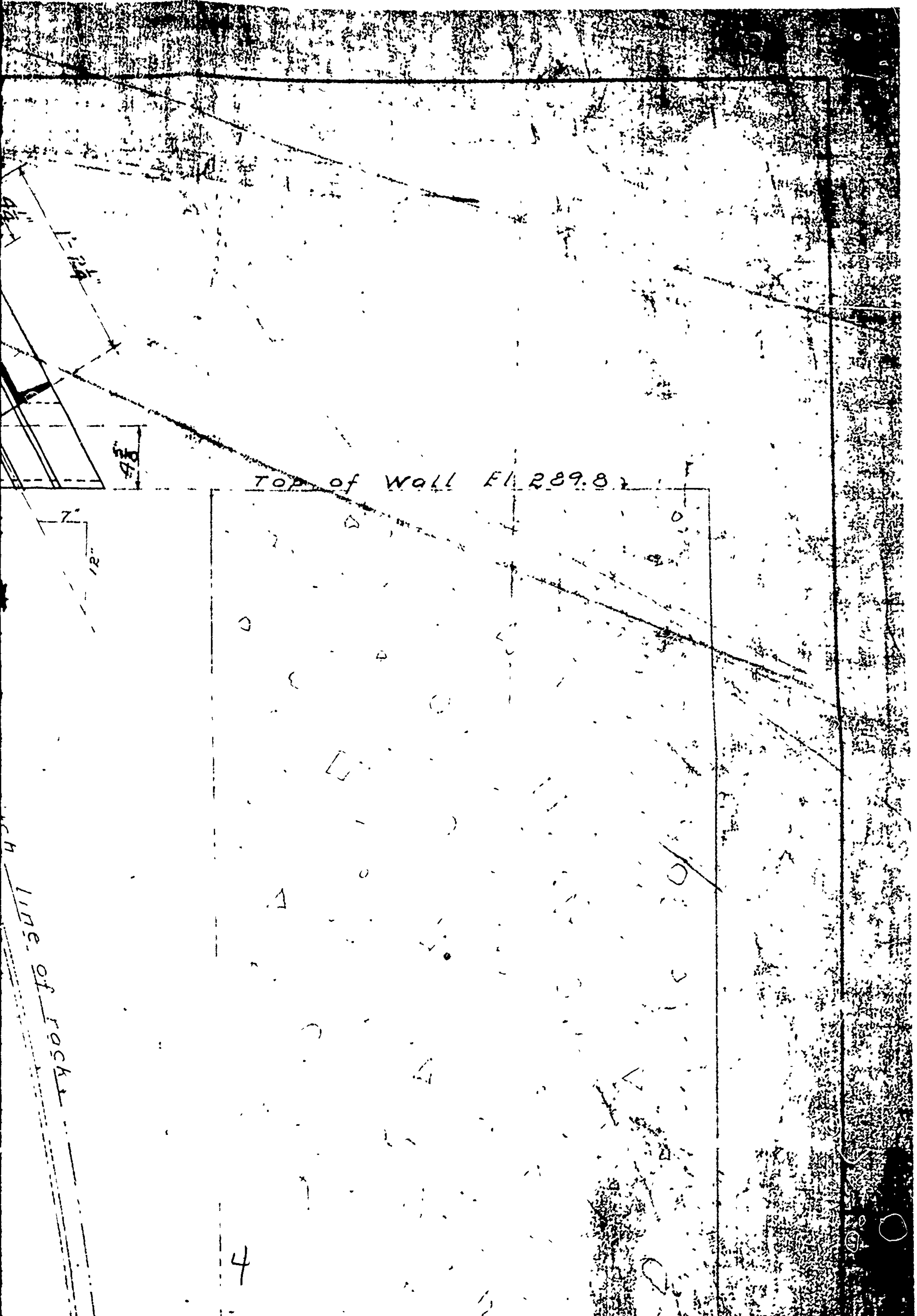
PLAN BB

2

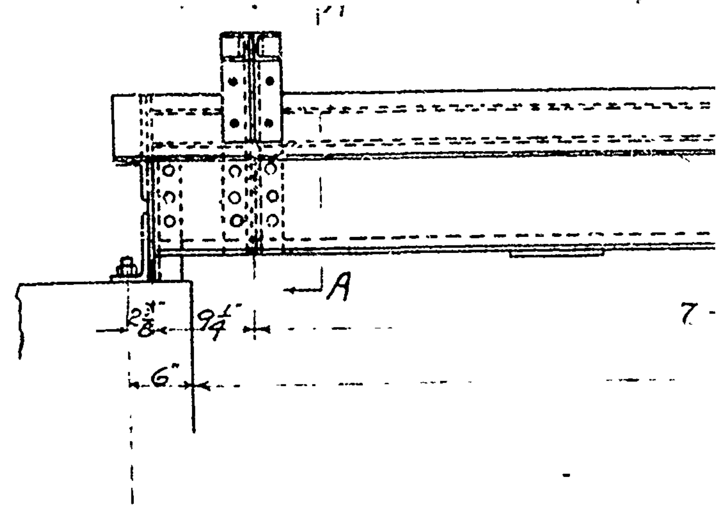
A


Bearing ABA
Shim
3"
Water seal in
highest position
Pitch line of rack
7"

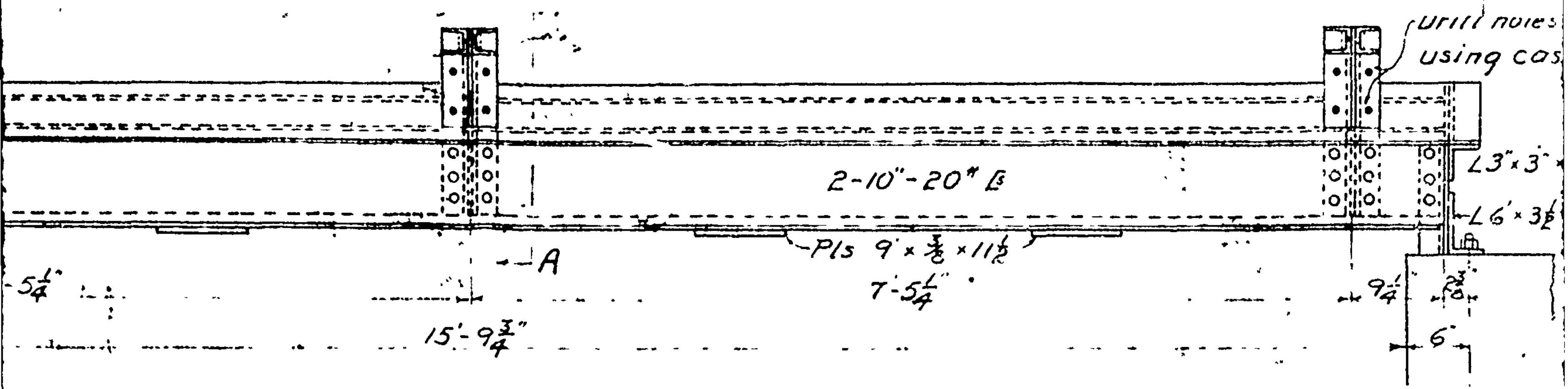
3



Top of Wall El. 289.8
line of rock
4



MADE BY J. L. Green Nov 13 1913
TRACED BY J. L. L. ... 13
CHECK BY C. E. Works for Machinery
CHECK BY C. W. Mac Clifford



FRONT ELEVATION

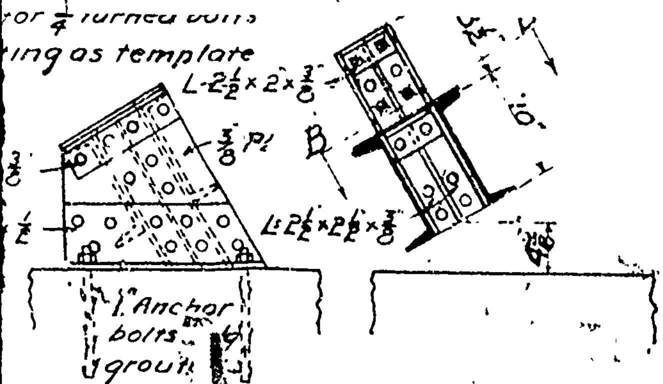
Scale $\frac{3}{4}$" = 1'-0"

1-Wanted.

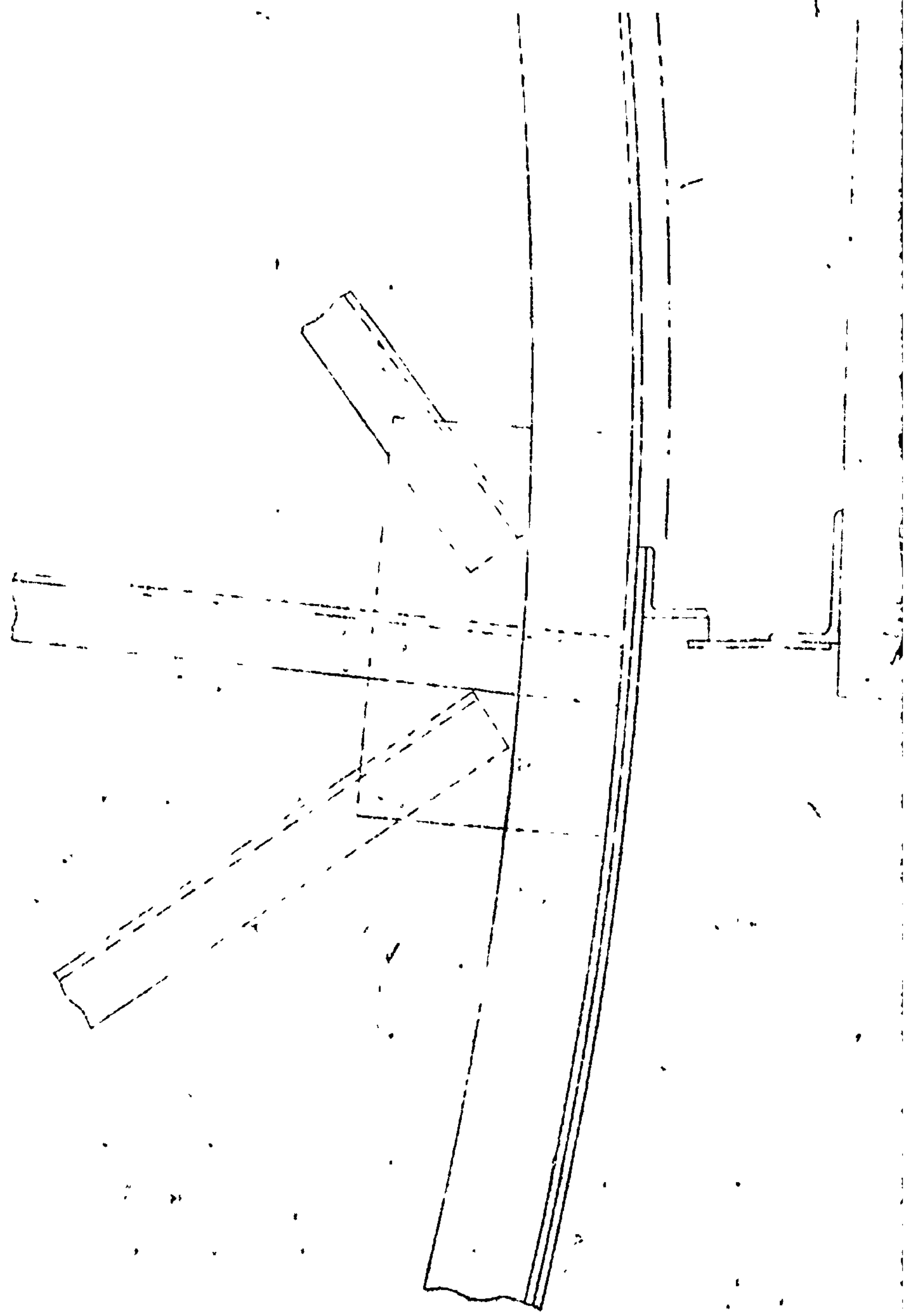
All material medium O.H. steel.
All rivets $\frac{5}{8}$" Holes $\frac{11}{16}$" unless other wise noted
Painting - Shop coat red lead and oil as per clause 10s of specifications.

This s
accordan

6



END VIEW SECTION AA



...heet is furnished in
...ce with note on sheet 58

Contra...

DET...

Champlain Canal...

Glens F...

DETAILS OF...

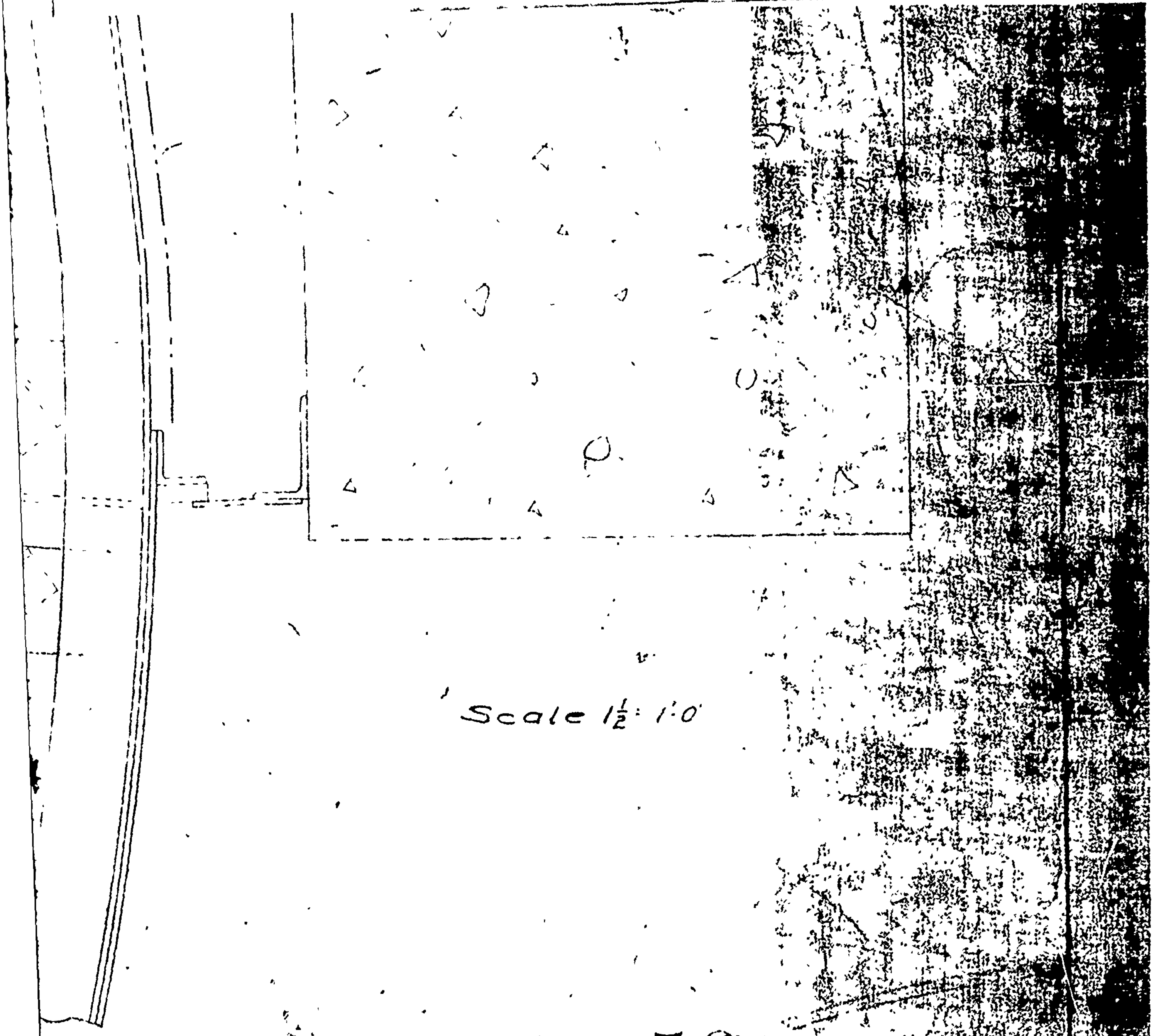
Scales a...

Examined and approved

November 17 1913

W. H. Gate...

Supervising Engineer



Contract No. 56.

DETAIL SHEET

Champlain Canal — Section 2

Glens Falls Feeder

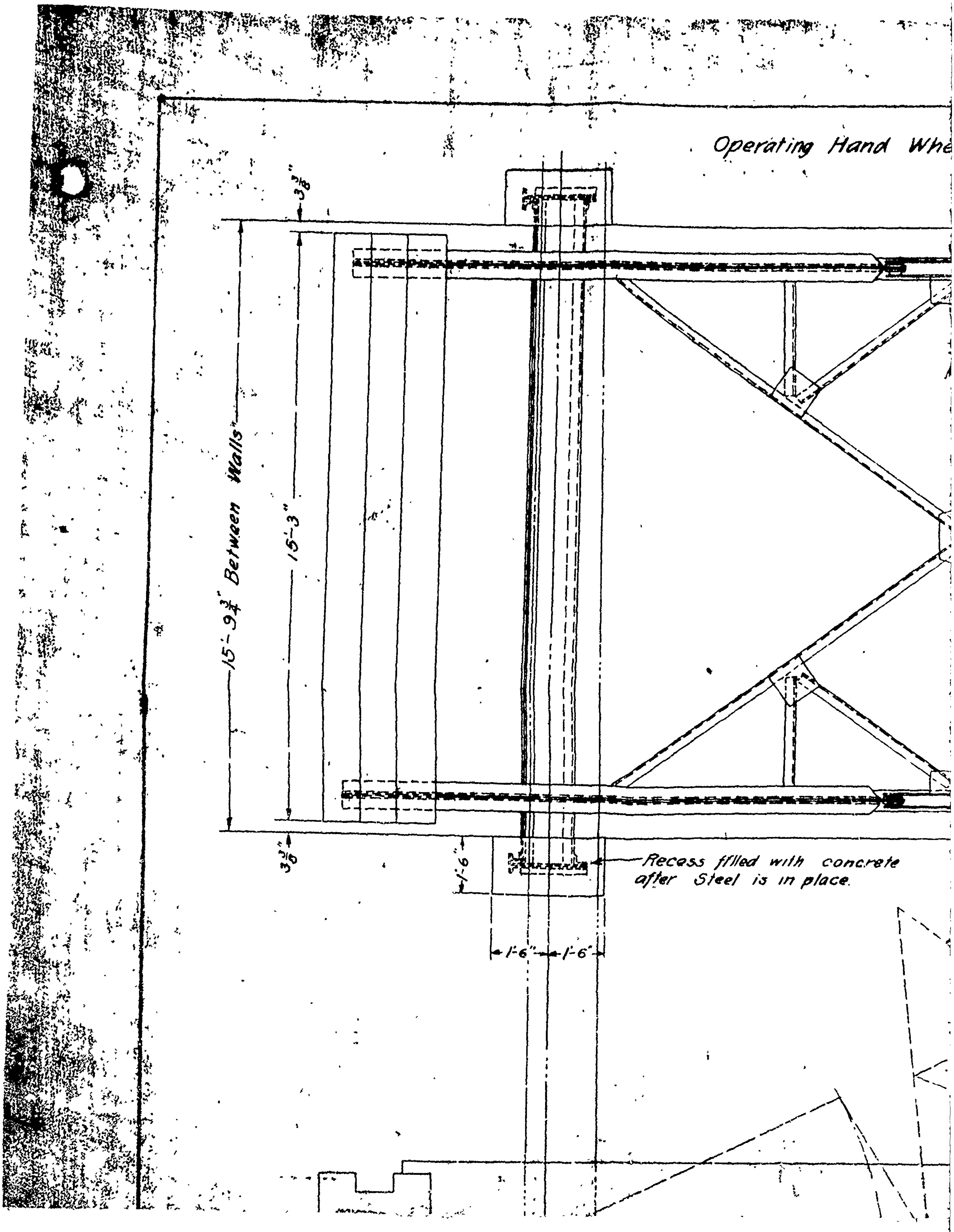
DETAILS OF TAINTOR GATE

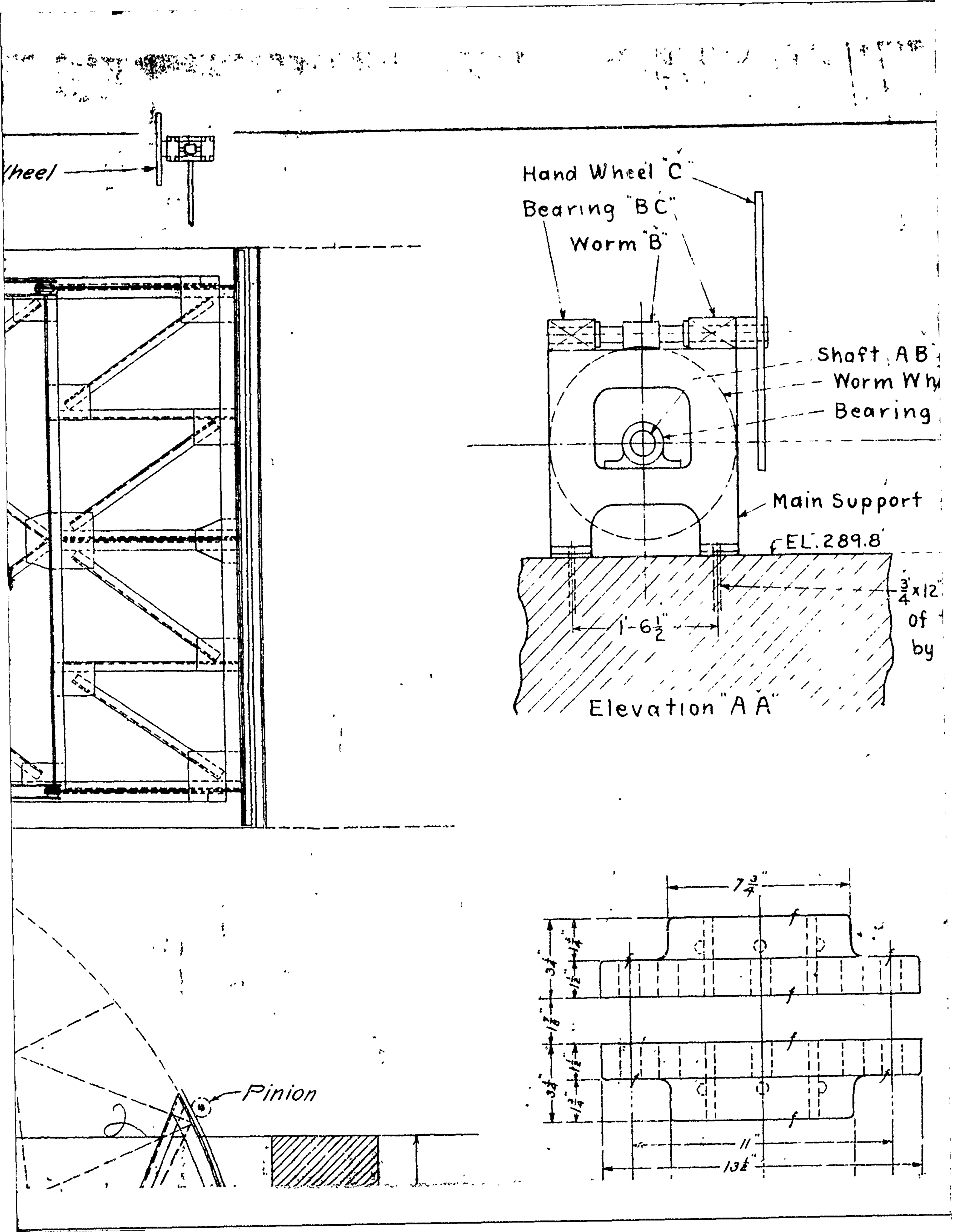
Scales as indicated

...d and approved
November 17 1913
...ter
Supervising Engineer

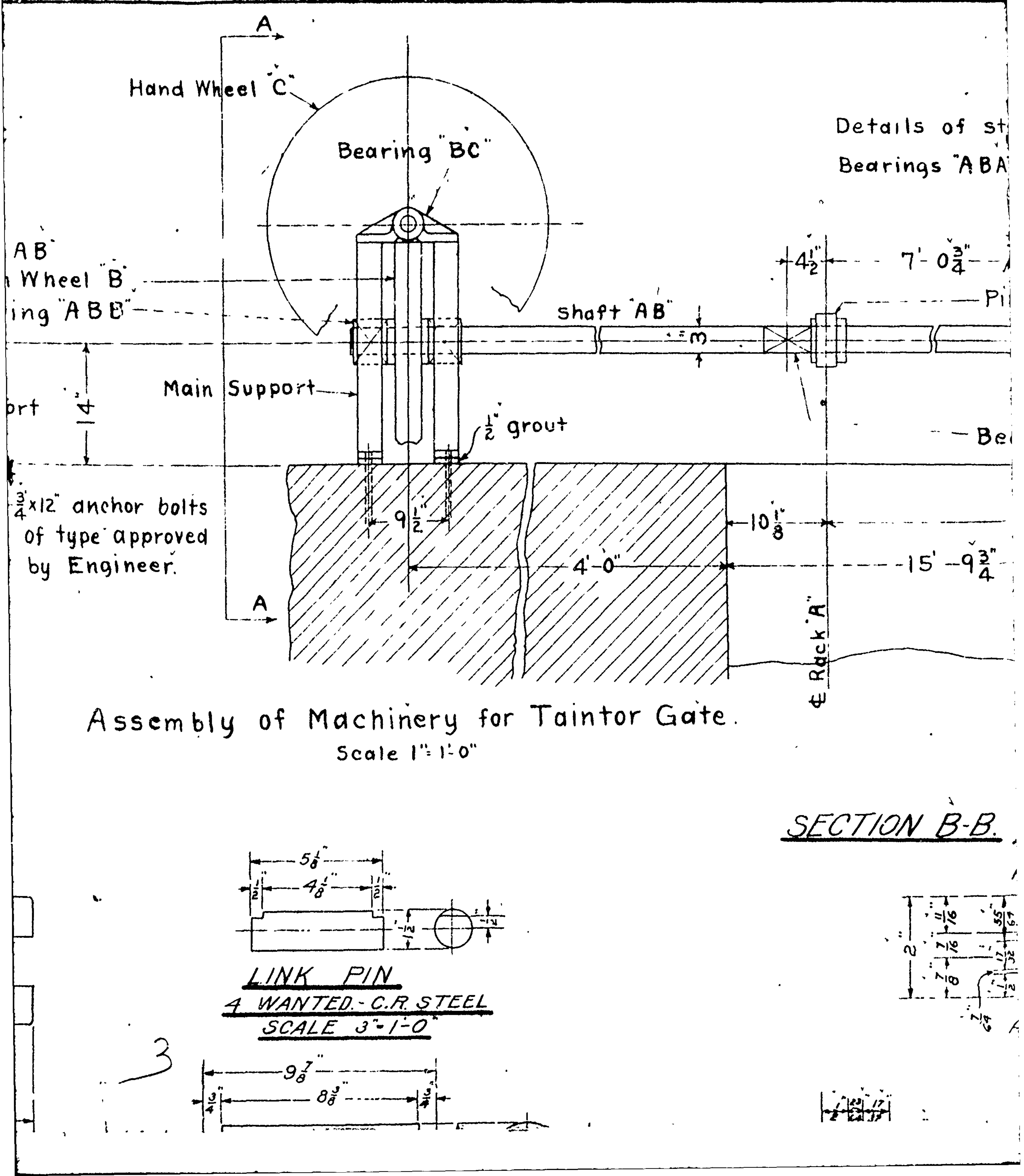
Examined and approved
November 17 1913
Alvie E. ...
Special Deputy State En...

8


Operating Hand Whe
3 3/8"
15'-9 3/4" Between Walls
15'-3"
3 3/8"
1'-6"
Recess filled with concrete
after Steel is in place.
1'-6"
1'-6"

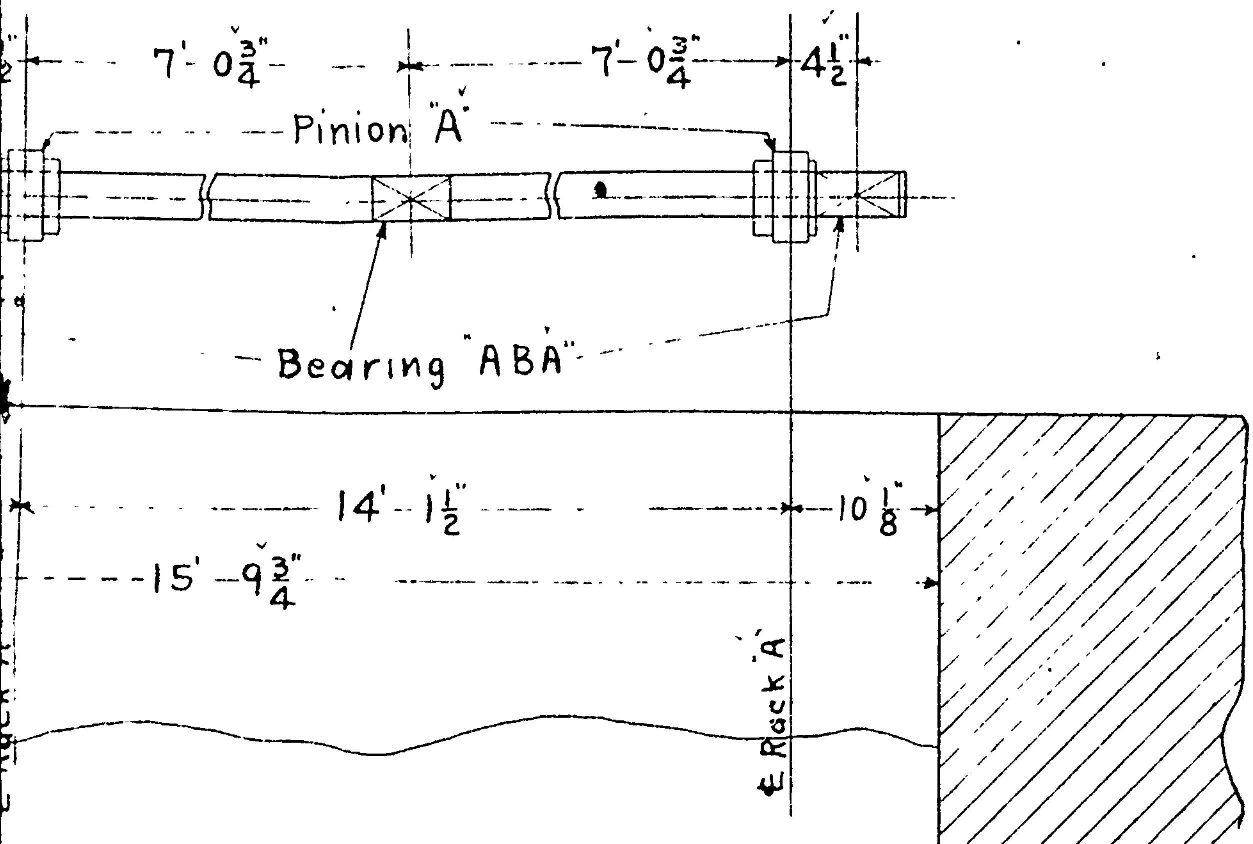


Wheel
Hand Wheel "C"
Bearing "BC"
Worm "B"
Shaft AB
Worm Wh
Bearing
Main Support
EL. 289.8
3/4x12"
of
by
1'-6 1/2"
Elevation "A A"
7 3/4"
3 1/4"
1 3/4"
1 1/2"
1 1/8"
11"
13 1/2"
Pinion

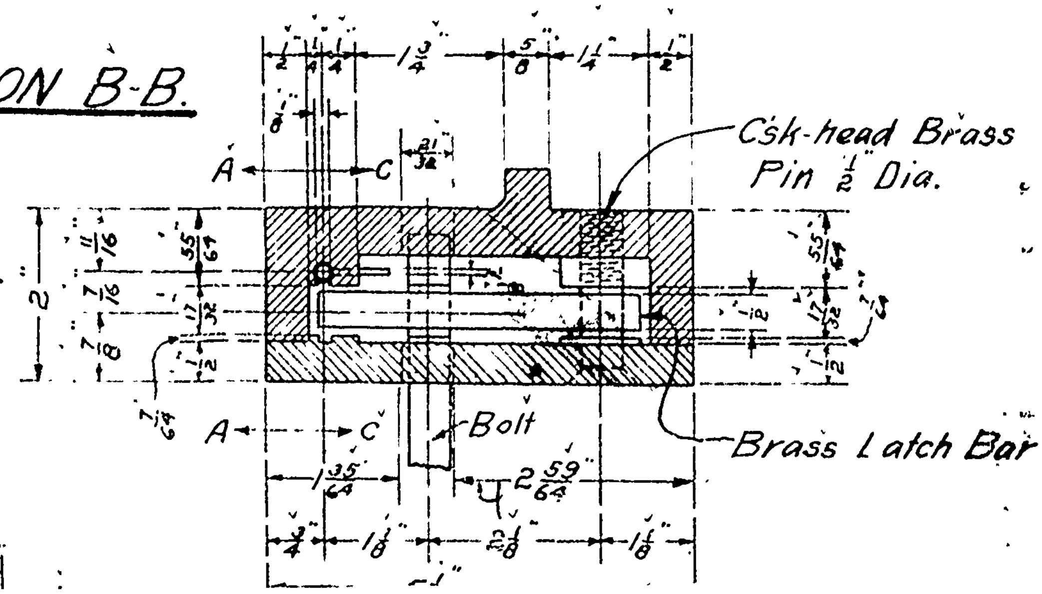


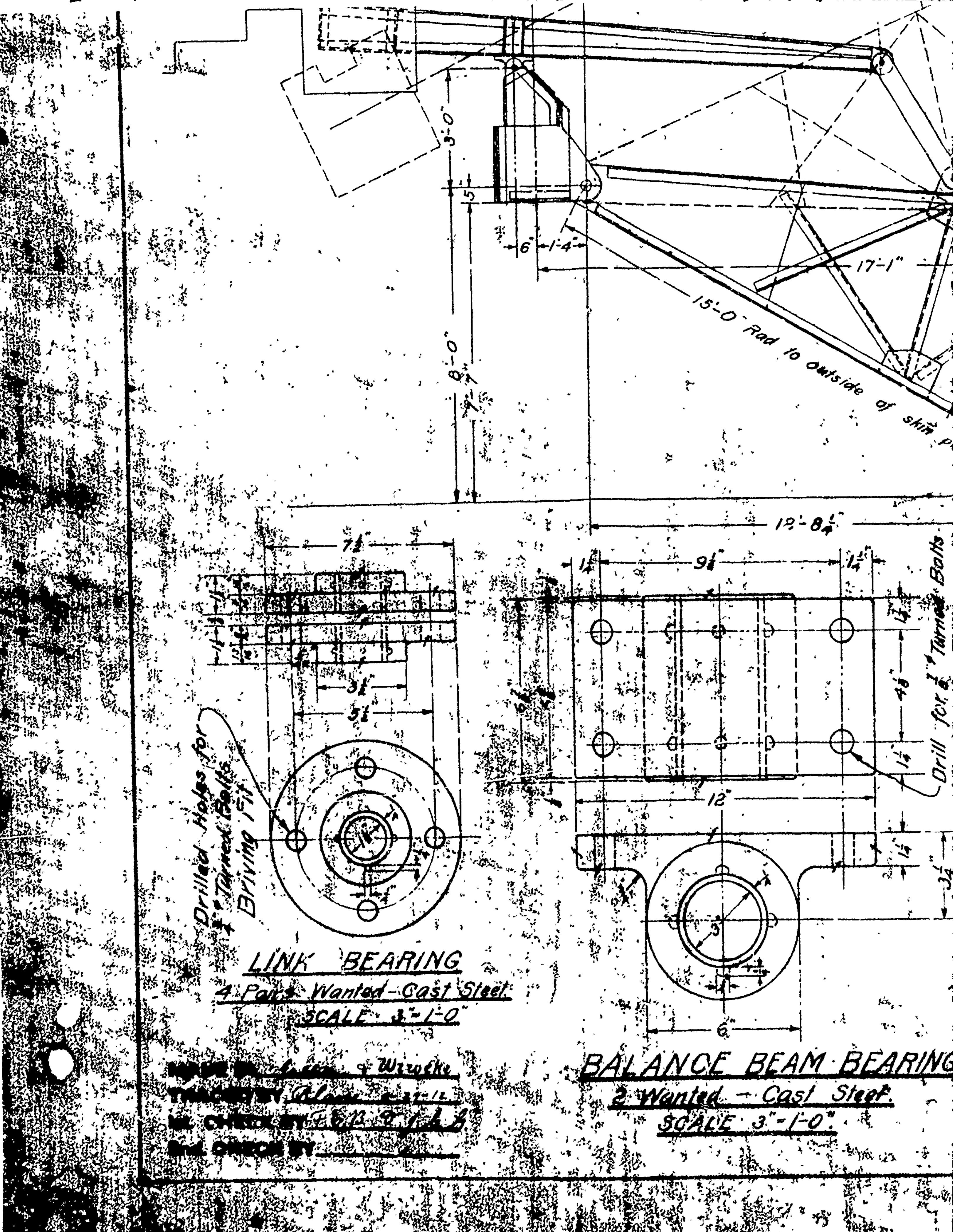
Hand Wheel "C"
Bearing "BC"
Details of st
Bearings "ABA
AB"
Wheel "B"
ing "ABB"
Shaft "AB"
m
4 1/2"
7'-0 3/4"
Pi
Main Support
ort
14"
1/2" grout
Be
3/4"x12" anchor bolts
of type approved
by Engineer.
9 1/2"
10 1/8"
4'-0"
15'-9 3/4"
A
A
℄ Rack "A"
Assembly of Machinery for Taintor Gate.
Scale 1" = 1'-0"
SECTION B-B.
5 1/8"
4 1/8"
1/2"
1/2"
LINK PIN
4 WANTED.-C.R. STEEL
SCALE 3"=1'-0"
2"
11/16
7/16
7/8
3
9 7/8"
8 3/8"
3/4"
3/4"

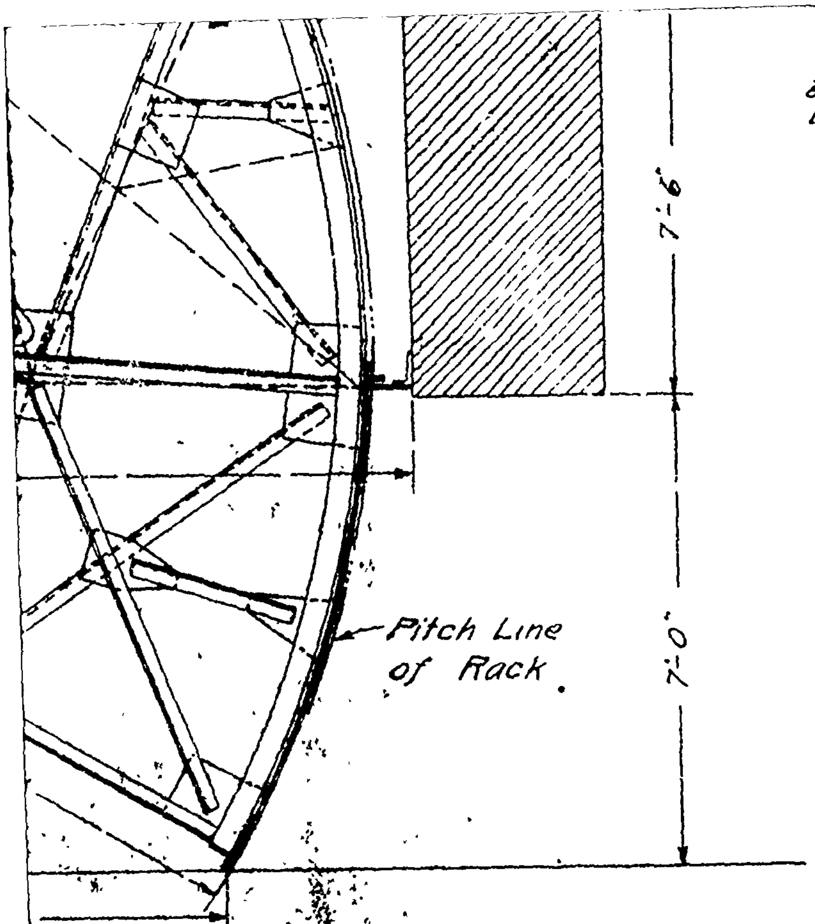
Details of structural supports for Bearings "ABA" will be furnished later.

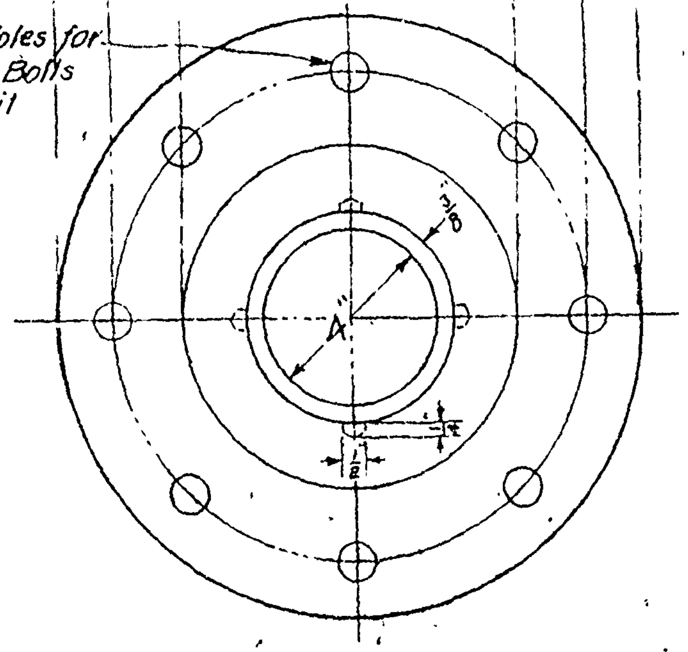


ECTION B-B.




3'-0"
5
6"
1'-4"
17'-1"
15'-0" Rad to outside of skin p
8'-0"
7'-7"
12'-8¼"
7½"
3½"
5½"
Drilled Holes for ¾" Turned Bolts Driving Fit
LINK BEARING
4 Pairs Wanted - Cast Steel
SCALE 3"=1'-0"
1¼"
9½"
12"
6"
Drill for ¾" Turned Bolts
BALANCE BEAM BEARING
2 Wanted - Cast Steel
SCALE 3"=1'-0"
TRACED BY
CHECKED BY

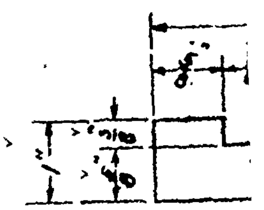


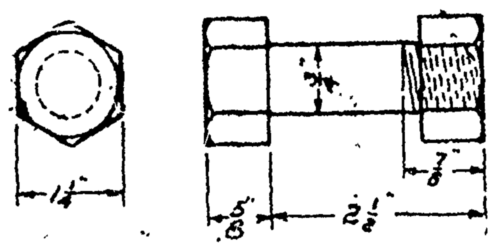


MAIN TRUNNION BEARING.

2 Pairs Wanted - Cast Steel.

SCALE 3" = 1'-0"

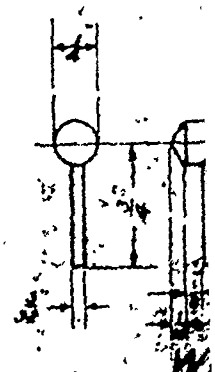




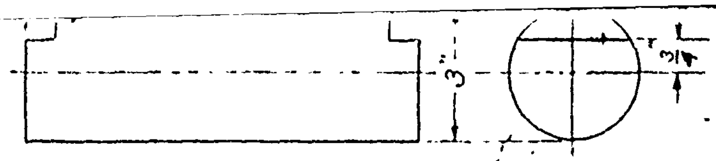
TURNED BOLT FOR LINK BEARING

16 WANTED

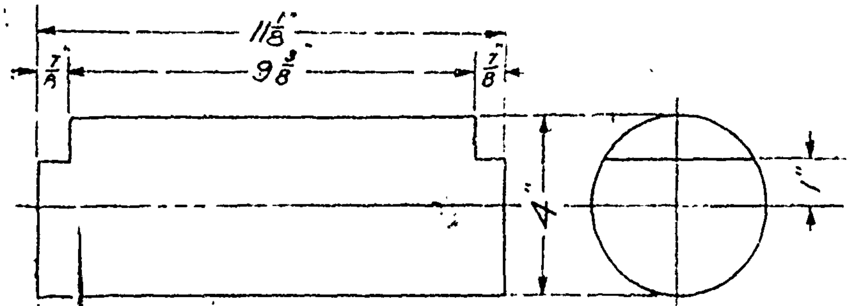
SCALE 6" = 1'-0"



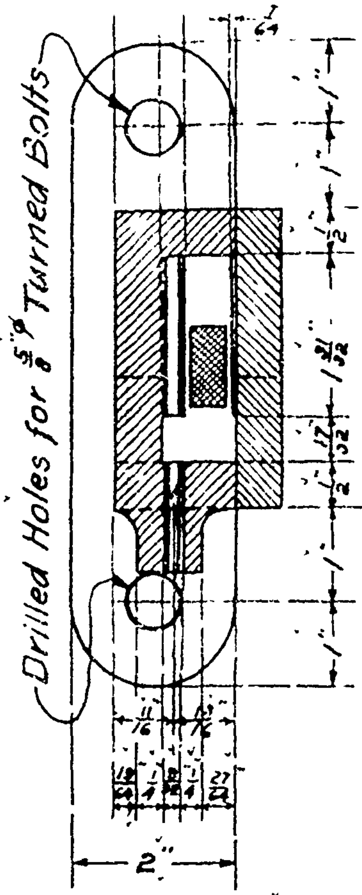
6



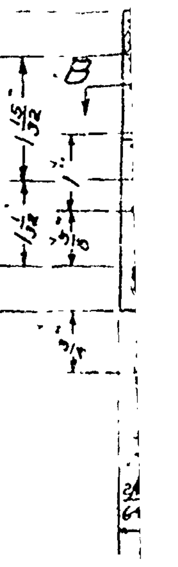
BALANCE BEAM PIN.
2-WANTED-C.R.STEEL.
SCALE 3"=1'-0"

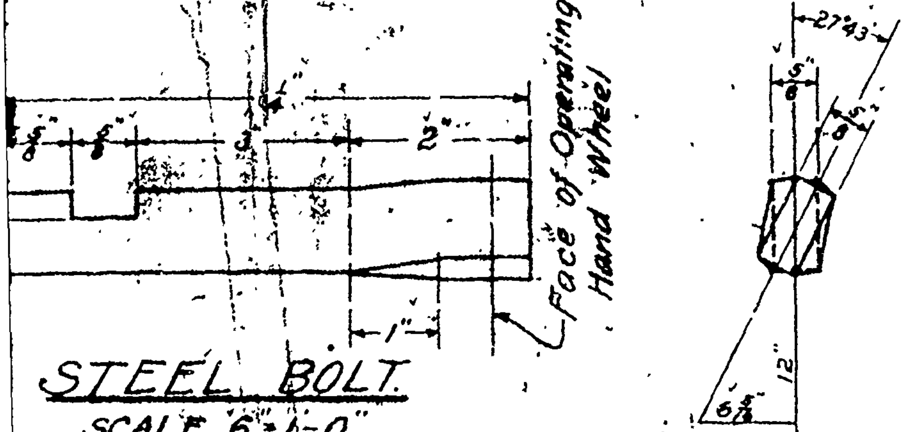


MAIN TRUNNION PIN.
2 WANTED - C.R. STEEL.
SCALE 3"=1'-0"

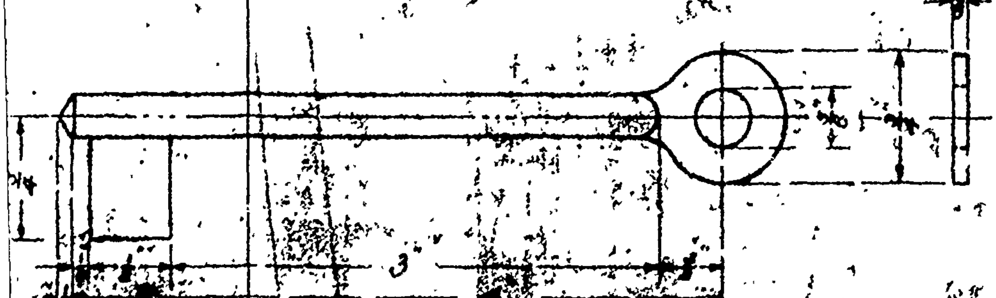


SECTION C-C
(Bolt Removed)



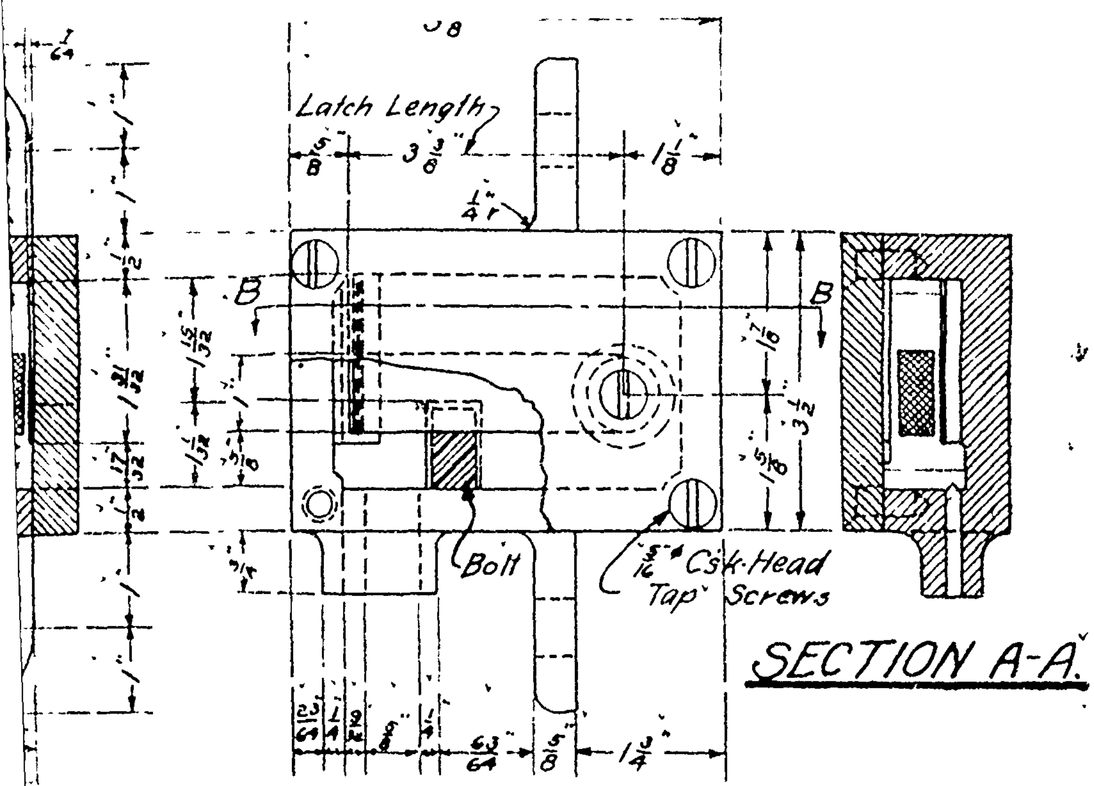


STEEL BOLT.
SCALE 6"=1'-0"
1-REQUIRED



WROUGHT IRON KEY
SCALE FULL SIZE
1-REQUIRED

Contrac
Champlain Canal
Glens Fa
DETAILS OF T



ELEVATION

CAST IRON LOCK.

SCALE 6"=1'-0"

1-REQUIRED.

C-C

(...d)

...ontract No. 56.

...ain Canal Section 2

Glens Falls Feeder

...AILS OF TAINTOR GATE

Scales as indicated

Examined and approved

July ... 1912